AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XLIX
Number 26

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, DECEMBER 27, 1923

Thirty-five cents a copy
Three dollars a year

Entered as second-class matter Jan. 2, 1903, at the post office at New York, N. Y., under Act of March 3, 1879.

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AUTOMOTIVE INDUSTRIES
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VOL. XLIX NEW YORK—THURSDAY, DECEMBER 27, 1923 No. 26

Happy New Year Looms Ahead for Automotive Industry

Fewer clouds on horizon than on any Jan. 1 for three years. 1924 sales volume likely to equal record 1923 business. Omens favorable for all branches of trade.

By James Dalton

THE new year's dawn finds the automotive industry facing the future with serene confidence. At the close of the greatest twelve months in its history there are fewer clouds on the horizon than there have been for three years. Favorable factors are:

1. Excellent general business conditions, notably:
   (a) More building contracts awarded than ever before at this time of year.
   (b) Almost unprecedented prosperity in the South.
   (c) Greatly improved agricultural conditions in the Middle West.
   (d) Practically no unemployment.
   (e) National purchasing power probably greater than ever before.
2. An extraordinarily strong financial structure:
   (a) In the banking system.
   (b) In the automotive industry particularly.
3. Little speculation in commodities and no sharp price fluctuations probable.
4. Better rail transportation than the country has had in fourteen years.
5. Small and well balanced inventories.
6. Unusually small stocks of finished products on hand either in warehouses or on dealers' floors.
7. A wealth of new jobs with which to interest the public at the shows.
8. Prices which give the purchaser greater value for his money than even in pre-war days.
9. An insatiable demand for motor vehicles, including cars, trucks and buses.
10. A replacement market which will insure the sale of at least 2,000,000 vehicles.

With such a foundation it is evident that there need be no apprehension regarding the volume of business for the immediate future at least. Automotive sales will not slacken perceptibly until the whole machinery of business slows up, and there are no logical bases for depression. The American standard of living has become so high and our purchasing power so great that all industry can be assured of a reasonable degree of prosperity unless productive capacity is greatly increased.

One psychological factor cannot be overlooked, however. This is a Presidential year, and we have become accustomed to a quadrennial pause while the nation awaits the result of the balloting. The actual effect of the elections undoubtedly is greatly exaggerated, and the political affiliations of the new President are of relatively little importance from a business point of view, but business is hesitant none the less. That was what Henry Ford had in mind when he announced last week that he was not a candidate and that he would support Mr. Coolidge.

THE campaign is six months away, however, and the country should be assured of a continuance of present conditions for that period at least. Fortunately, there has been an almost complete recovery from the unaccountable feeling that there had been a sharp decline in business and that times were not good. That misapprehension was almost entirely psychological.

When the statistics for the year are compiled it

will be found that it was the greatest in the history of American business in virtually all lines. Car loadings, the barometer of barometers, will show an aggregate of more than 50,000,000 for all commodities which will exceed 1920, the previous record year, by 5,000,000 and 1922 by nearly 7,000,000.

Notwithstanding protestations of alarm over the extravagance of Americans in buying motor cars, savings deposits for the country will reach the amazing total of $18,373,000,000, a gain of $1,042,000 over 1922.

Records Made in Building Contracts

New peaks were reached in building construction and more contracts are being awarded now than ever before at this time of year. Despite the enormous volume of work done in the past two years, there remains a huge shortage of buildings of all kinds and a continuance of prosperity in the construction trades is assured.

Agriculture is closing the year in a much stronger position than seemed possible six months ago. Final estimates of the Department of Agriculture fixed the farm value of all crops, as of Dec. 1, at $8,322,695,000, an increase of $880,000,000 over 1922 and nearly $2,000,000,000 over 1921.

The corn crop, at 72.7 cents a bushel, had the greatest value, with a total of $2,222,000,000, as compared with $1,919,775,000 last year, when the selling price on the same date was 68.5 cents.

The farm value of all wheat was estimated at $721,500,000, as compared with $873,400,000 last year, with an average selling price 100.7 cents, as compared with 92.3 cents in 1922.

The cotton crop was valued at $1,563,000,000, as compared with $1,161,000,000 on the same date in 1922, thus showing the greatest gain.

Farmers in Good Condition

One factor of almost as great importance as the value of the crops is that most farmers are now practically out of debt, and for that reason feel a stronger urge toward buying the commodities they need. That condition has prevailed in the South for a year.

It is apparent, therefore, that the country begins the new year under the most favorable auspices, and motor vehicle sales are dependent in large measure upon general business conditions. This applies especially to commercial vehicles.

Virtually all automotive companies have become eager students of economics and they are familiar with conditions in all sections of the country. They know there are a few weak spots and many which are strong. Naturally they will cultivate those in which sales prospects are the best, and agricultural areas will be better relatively than industrial sections, where sales of motor vehicles have been largest for the past eighteen months.

This shift in business is likely to be one of the striking characteristics of the coming year. Those sales managers who give closest attention to districts in which sales have not been heavy for the past two or three years, but where money has become relatively easy, will be likely to make good records. The wheat growing States, for example, will offer a better market than the bituminous coal districts, where mines are closed because of mild weather and curtailed demand. Cotton growers will be better prospects than manufacturers of heavy clothing for about the same reason.

While the automotive industry has every reason to expect in the first half year, at least, a volume equal to the first half of 1922, it is not justified, generally speaking, in extravagant hopes of another huge gain in the volume of sales. If the percentage of gain in 1924 over 1923 were to be as great as it was this year over last, the aggregate production for the twelve months would be approximately 6,000,000. It is exceedingly improbable that the industry ever again will see as great a rate of gain as it has in the past. It is quite logical that the number of first buyers will decline year by year as the nation becomes more completely motorized. Approximately half its families already own motor cars. Most of the others will become buyers only as their economic status improves.

Production of cars and trucks for 1923 will fall from 25,000 to 50,000 short of 4,000,000, and there appears to be small chance that the 1924 total will exceed this number. Estimates range from 3,000,000 to 5,000,000, with a majority fixing 3,500,000 as nearer the mark. This would be a drop of 12½ per cent from 1923, but 33 per cent above 1922. Unless there is a much more serious business depression in the second half of the year than now appears likely, sales are not likely to fall much below the 3,500,000 mark. If they reach or approximate this figure they will keep the industry going virtually at capacity.

Replacement Market Will Be Large

The chief factor of uncertainty so far as 1924 is concerned is the size of the replacement market. No one can estimate accurately what it will be, but a guess of 2,000,000 is as good as any. Replacement buyers are influenced to a greater degree than first buyers by general business conditions. They experience no great difficulty in making the old car run a year longer if they so desire.

Notwithstanding the fact that total sales next year are likely to be no larger than they were in 1923, practically all the larger makers are basing their production schedules on a bigger volume of sales. Some one, quite naturally, will be disappointed. Statistics for the last year do not indicate that the smaller companies are losing ground, although they are little more than holding their own in respect to their percentage of the total output. They may be expected to do just about as well next year. There are a few weak concerns which may not be able to stand the pace, but their total output is so small a part of the whole that their elimination will have little effect on the picture as a whole. The gap they leave will be filled by new companies which already are entering the field.

Competition among the stronger companies will be sharper than it ever was before. They are in strong financial position, however, and well fortified for a long siege. The battle for business in the "light six" division will be especially bitter. The number of new jobs in this field in all price classes is becoming steadily larger.

Keen Competition Likely

The announced determination of Henry Ford to produce at the rate of 10,000 a day, or 3,000,000 a year, in 1924, and Chevrolet's expectation of selling 800,000 next year are especially interesting. If they succeed in reaching the goals they have set, and it may be that they can, it is obvious that the year's aggregate production will run much beyond 4,000,000. One of the objects of Ford's $7,000,000 newspaper, magazine and billboard advertising campaign is to increase sales on a national basis. Chevrolet also will have the benefit of a very large advertising appropriation. Overland and the revamped Star, as well, will be out for big business in the Chevrolet price class.

It has been estimated that the motor car buyer is getting $1.11 in automobile value for his dollar on the basis of pre-war comparisons, and this is a unique dis-

HERE is a thumb nail survey of fundamental business trends as 1923 comes to an end:

COMMODITY PRICES—Raw materials prices are fairly steady and relatively low.

PRODUCTION—Although somewhat spotty, production continues in good volume. Some seasonal declines at this time of the year are natural.

LABOR CONDITIONS—Labor is well employed. There have been a few wage cuts but there is no definite tendency towards a lower level.

CAR LOADINGS—While still abnormally high, there has been a decline from peak records because of a seasonal decline in certain trades and industries.

AGRICULTURE—Each month sees an improvement in agricultural conditions.

DOMESTIC TRADE—Trade conditions to show the gain which has characterized recent months and the volume of holiday business promises to establish new records.

FOREIGN TRADE—Slow but sure gains continue in foreign trade.

MONEY AND BANKING—Money and credit conditions are as satisfactory as ever before in the history of the country.

INVESTMENTS—The stock market is still strong after more than a month of upward movements.

GENERAL OUTLOOK—A slight decline is to be expected after the holiday activity, but it need cause no uneasiness.

tinction. Sharp price reductions are not likely, therefore. It would seem that increased production is about the only basis upon which cuts can be made, and several companies will have to maintain present volume to justify the prices at which they are now selling. There is no disposition to lower existing standards of quality.

Commodity prices may come down somewhat, but sharp drops are not to be expected. Parts and accessory makers, who long have complained that their margin of profit had reached almost the vanishing point, are not likely to find it possible to give concessions to their customers. The trend may be in the other direction, especially in the case of tires. Volume alone has permitted manufacturers in this field to show substantial earnings.

Business in the commercial vehicle field is more likely to show a gain over 1923 than in the passenger car field. Production both in 1922 and 1923 was about 10 per cent of the total. Demand for motor buses is leaping ahead. Sales this year have been the largest in history and it would not be surprising if they were twice as large in 1924. Replacement demand for all varieties of trucks, but more especially in the heavy duty class, promises to rise materially, inasmuch as many of those produced in the war period have about outlived their usefulness.

The map in the truck industry undoubtedly will show a good many changes before the close of 1924. Several of the smaller concerns will have to abandon attempts at national distribution and concentrate or specialize their efforts or go out of business.

Tire Business Improves

As the year closes there are substantial indications of improvement in 1924 in the tire field. Consumers now are getting something like $1.20 for their dollar, as compared with the pre-war period. Competition has been exceedingly bitter and a good many small companies have been unable to stand it. Productive capacity has been reduced considerably and there will be better business, consequently, at a larger profit for those companies which remain.

Export business for all classes of automotive products was better in 1923 than ever before, showing a material increase over 1920, which was the record year. A total of about 325,000 cars and trucks was sent to overseas markets, while sales of parts and accessories showed an even larger proportional gain. There is every indication that 1924 will show an even larger export business.

The rate of gain in this field will be considerably larger than it is at home, because the potential foreign demand scarcely has been scratched. The prediction has been made by persons thoroughly familiar with all the conditions that the ultimate overseas market will be 1,000,000 cars and trucks annually. This business will grow as good roads are built, and most foreign countries, especially those of Latin-America, are displaying an unprecedented interest in highway development.

Parts Sales Increase

Indications now are that registrations of motor vehicles in this country on Jan. 1 will run from 13,800,000 to 14,000,000. It is obvious, therefore, that manufacturers of replacement parts and accessories cannot fail to do an enormous business in 1924. Their sales unquestionably will surpass all previous marks.

Outlook for dealer organizations fortunately is somewhat brighter than it has been this year. Notwithstanding the biggest year on record, many of them have failed to make money. This has been due in part to used cars and in part to reduced territories. Manufacturers recently have shown a tendency away from territorial restrictions, however, and toward larger discounts. It is probable that even with a larger output less money was lost this year on used cars than in 1922, and further progress in this direction may be expected in 1924, although the used car remains the most serious dealer problem. It also must be faced squarely by the manufacturer, because it has a direct relation to the sale of new products.

From a mechanical point of view the year will give a thorough test to four-wheel brakes, balloon tires and other devices designed to improve the comfort and efficiency of motor vehicles. The usual degree of progress can be expected in design and construction, both of chassis and bodies.

Among the bigger collateral problems with which the industry must grapple more seriously than in the past will be coordination of all forms of transportation, relief of traffic congestion and prevention of highway accidents.

Altogether 1924 promises to be one of the happiest years in the history of the industry. There will be a huge volume of business in the aggregate. How it is divided will depend upon the sales and servicing ability of individual companies. If it brings a clearer conception of the fact that sales and service are so closely related that one cannot be separated from the other, it will have marked a long step forward both for the industry and for the users of its products.

Chrysler Six Appears with Seven Bearing Crankshaft

Engine is L-head type. Has piston displacement of 201 cu. in. Bore is 3 in. and stroke 4¾ in. Is being produced in Chalmers plant. Three closed and three open body types supplied. The roadster has a special gear ratio giving speed of 75 m.p.h.

THE Chrysler Six, which has been under development for the past three years and which will be marketed through the Maxwell-Chalmers organization, is now in production at the Chalmers plant. This plant has been retooled for the new car, and production jobs are now coming off the line. The manufacturing program and the tooling of the plant have been under the supervision of Walter Chrysler. The fact that the car is an entirely new design, utilizing very few stock parts, has necessitated complete retooling of the plant.

Although the car has been designed literally from the ground up by the Chrysler organization, there have been no radical departures from existing practice. The powerplant is an L-head, block-cast six of 3-in. bore and 4¾-in. stroke, developing an average of 68 b.hp. at 3200 r.p.m. on block-tests. With a piston displacement of 201 cu. in., this is 0.34 hp. per cu. in. As these figures would indicate, the engine has been designed from a performance standpoint, but production costs also have been considered, as indicated by the predominance of flat surfaces.

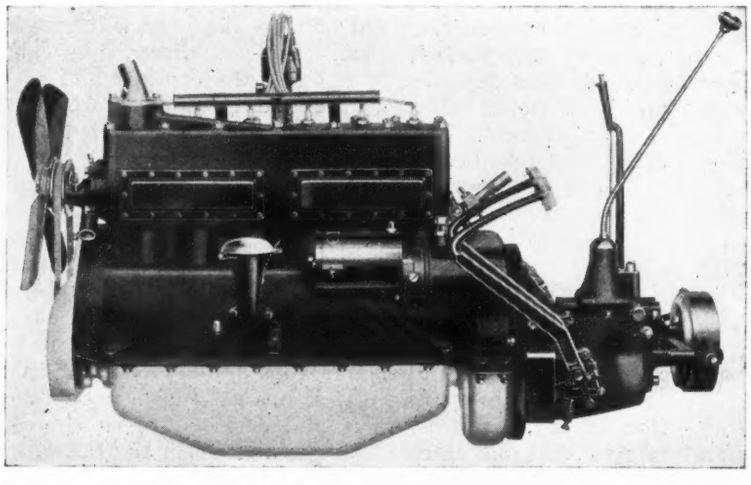
The writer drove one of the first cars over the roads about Detroit and found that it had a speed range up to 68 m.p.h., with a gear ratio said to be 4.6 to 1 and with the standard 29 by 4½-in. tires. This car was a five-passenger phaeton and carried a full complement of passengers. The weather was rainy and there was no doubt sufficient slippage of the rear wheels to justify the manufacturer's claim of 70 m.p.h. for other than the full-passenger load. Measurements are said to have shown that the car will accelerate from 5 to 25 m.p.h. in 8 sec., and from 5 to 50 m.p.h. in 13 sec.

In the design of the engine efforts have been made to secure the same output from all cylinders. The distribution system is designed for liquids rather than for vapor or gas, and uniform cooling is assured by carrying the water completely around each cylinder barrel and around each valve seat. In seeking to equalize the output, exhaust gas analyses were made on samples from all cylinders, as a check on distribution and other factors governing combustion. In boring the cylinders, the machines are so arranged that the same tool enters each cylinder barrel in the block, thus reducing variations in the cylinder diameter to a minimum by eliminating set-up and tool-wear errors. The slower work is compensated for by a multiplicity of machines.

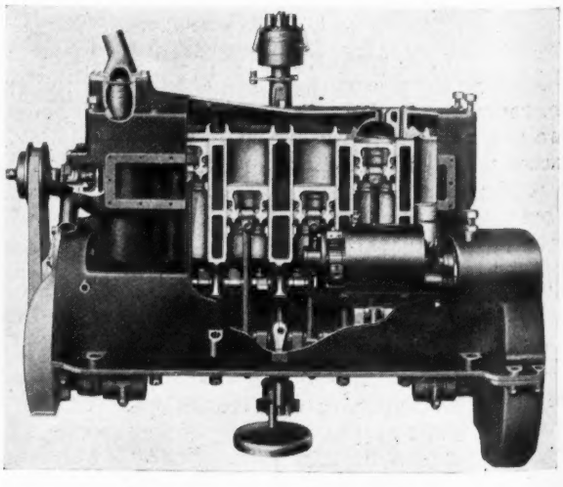
Six Body Models Furnished

A complete line of bodies will be furnished. There are three closed and three open types, one of the latter a roadster with a special gear ratio, on which a maximum speed of over 75 m.p.h. is guaranteed. All of the cars have Lockheed hydraulic four-wheel brakes as standard equipment and with one exception all are fitted with six-ply balloon type tires, 29 by 4½ in., the special sedan having 30 by 5-in. tires. Both these sizes fit the same rims. The body lines are distinctive, with an impression of length due to the lowness of the car, accentuated by the small wheels. Incidentally, even the wheels were designed particularly for this car, the short, thick spokes being noteworthy.

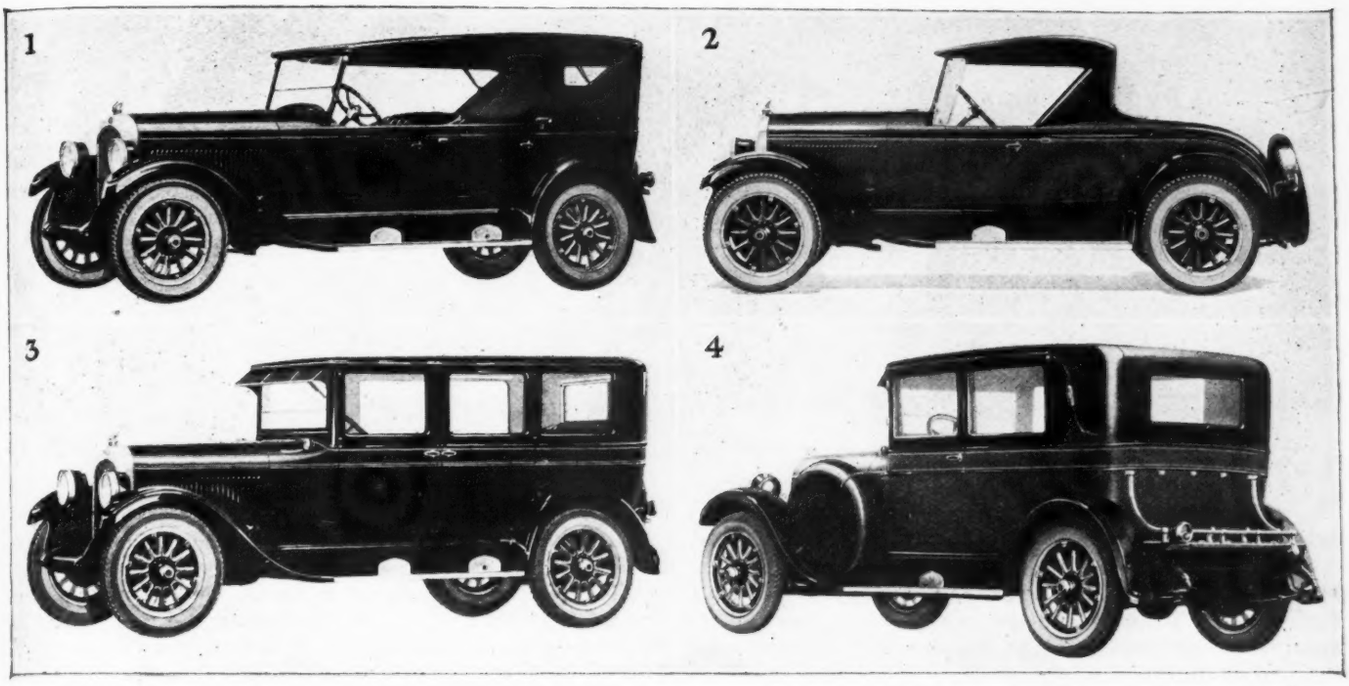
The cylinder block is cast integral with the upper half of the crankcase. The cylinder head is a separate cast-



Outside view of powerplant



Cut-away view of powerplant



1—*Special touring car*
2—*Roadster*
3—*Special sedan*
4—*Brougham*

ing and contains the combustion chamber, which is shaped for high turbulence, with a dome above the valves tapering down to a clearance of only 0.050 in. above the piston on the side opposite the valves. The compression ratio is 4.6 to 1. The crankcase has seven integral webs or bridges to support the crankshaft bearings.

Lynite Pistons Used

The Lynite slotted skirt pistons are 3 7/16 in. long, with 0.003 in. clearance. The three ⅛-in. rings are all above the piston pin. The piston pin is of ¾-in. seamless alloy steel tubing, clamped in the end of the rod. The connecting rods are 10 in. long between centers, with a lower bearing of 1⅞ in. diameter and 1⅜ in. width. The connecting rod and the crankshaft main bearings are all of the Chadwick type, the babbitt being cast under pressure over a mandrel, thus eliminating machining and burnishing operations. The main bearings are all given an initial clearance of 0.002 in. and with this clearance, it is claimed, the usual 500-mile "breaking-in" period is eliminated and the car can safely be driven at speed when new. The bearings are the shimless type.

The crankshaft is machined all over and the aggregate length of the seven bearings upon which it is supported is equal to 5/9 the total length of the shaft. The bearing diameters are all 1⅞ in. The lengths are: Front, 1⅞ in.; Nos. 2, 3, 5 and 6, 1⅛ in.; center, 1 9/16 in.; rear, 2 7/16 in. The thrust is taken on the rear main bearings.

Morse silent chain drive is used for the cam and accessory shafts. There are three sprockets in the train, adjustment being made on the accessory sprocket by means of the movable generator bracket. The camshaft is mounted on four bearings, which increase in diameter from 1 3/16 in. at the rear to 2¼ in. in front. The valve tappets are mushroom type, with chilled cast-iron heads welded to a tubular steel stem. The tappets are mounted in groups of six in removable guides. The tappet clearance is 0.006 in. The inlet valves are chrome nickel steel and the exhaust valves are Silcrome. Both are 1 7/16 in. in diameter, with 11/32 in. stem diameter and 5/16 in. lift.

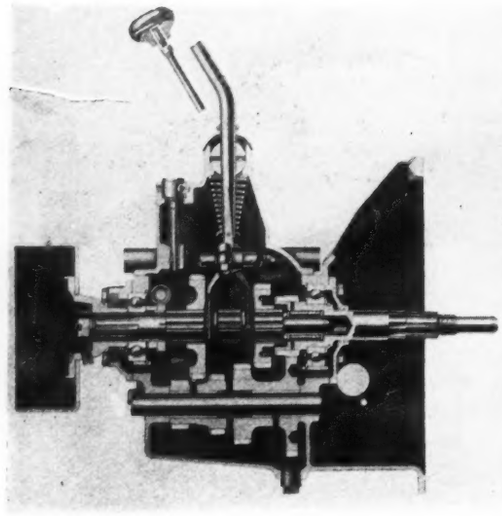
Lubrication is by pressure to all crankshaft, connecting rod and camshaft bearings. The gear oil pump is driven from a spiral gear on the camshaft. The camshaft, as well as the crankshaft, is drilled for oil passage. The oil leads are contained in the crankcase casting. The normal oil pressure is 25 lb. per sq. in. An oil filter is provided, mounted on the front of the dash. The oil gradually passes through this and it requires approximately 10 miles of running for all of the oil to pass through. This is claimed to make frequent oil changing unnecessary.

Water circulation is by a pump, which is driven by the fan pulley and mounted on the rear end of the fan shaft. The pump housing is in the cylinder block. The pump has six impeller blades. Circulation of the 4-gal. water supply is controlled by a built-in thermostat at the front end of the cylinder head casting. The water is held imprisoned, except for a very small bypass, until the operating temperature is reached, at which time the thermostat opens, permitting circulation of the water. The water passages around the cylinders are large, the minimum distance across the space between the cylinders being ½ in. The direction of water flow is controlled by graduated water spaces between the cylinder block and the head, which are designed to insure equal circulation to all cylinders and valves. The radiator is a honeycomb design. The fan is a four-blade 16-in. unit, driven by a V belt. The water temperature in the system is registered on the dash by a radimeter.

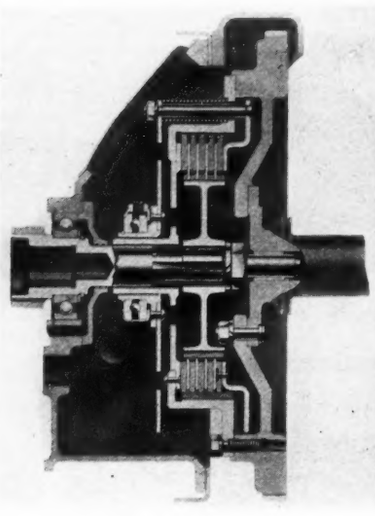
Electrical Equipment

The Remy electric starting, lighting and ignition equipment is 6-volt, single-wire type. The generator has third-brush regulation. Ignition is controlled by an automatic advance as well as by a hand spark lever.

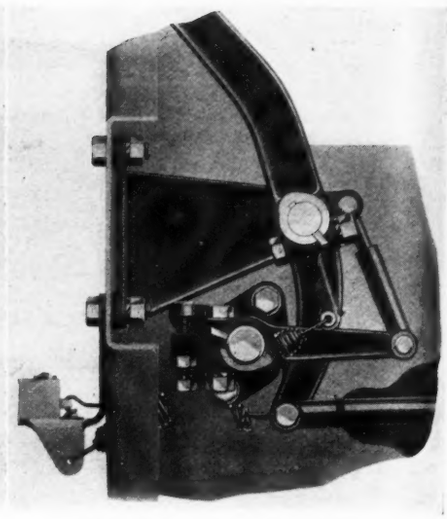
Fuel is fed from a 12½-gal. tank mounted on the rear of the frame by a Stewart vacuum tank to a Ball & Ball two-stage carbureter, equipped with a centrifugal air cleaner. The intake and exhaust manifolds are cast in one piece, the center portion of the intake manifold being jacketed by the exhaust manifold. The engine is a four-port type, this design being selected in preference to the



Transmission assembly



Clutch assembly



Clutch pedal adjustment

three, in spite of the somewhat increased manufacturing cost, because, according to the engineers, it has advantages from the standpoint of distribution. The intake manifold is designed to secure high turbulence through abrupt turns, and the characteristics of all passages from the carbureter to individual cylinders are made as nearly as possible identical. A fuel economy of better than 20 miles per gallon is claimed.

Accessibility of the powerplant has been promoted by the use of an intermediate cross-member, which acts as a sort of spacer between the rear end of the crankcase and the clutch housing. This banjo-type cross-member extends between the side rails of the main frame, and both the clutch housing and the rear of the crankcase are bolted to it so that it is possible to take out the engine, leaving the clutch and transmission in place, or the engine can be left in place with the clutch and gearset removed. The interior of the engine is accessible when the bottom pan is dropped. The valve tappets can be lifted out as assemblies without disturbing the block, and practically the entire engine can be taken apart without taking the block out of the frame.

Multiple Dry Disc Clutch

The clutch is a multiple dry disk unit, with five molded asbestos driving disks and four steel driven disks, giving a total of 148 sq. in. friction surface. The teeth on the periphery of the Raybestos fabric driving disks are cut directly in the fabric. The ball thrust throwout bearing is contained in a grease-tight housing. There is a large inspection cover on the housing. The clutch and three-speed gearset are assembled with the engine and the banjo cross-member as explained, as a unit powerplant. The gearset is a three-speed unit with 3½ per cent nickel steel gears. The clutch shaft is mounted on ball bearings. The spline shaft pilot bearing is a Hyatt roller. The countershaft is stationary. The bushings are bronze. The ratios are as follows:

High	Direct
Intermediate	1.895 to 1
Low	3 286 to 1
Reverse	4.04 to 1

Final drive is by the Hotchkiss system. The drive is taken through two Detroit metal universals and a hollow propeller shaft to a semi-floating rear axle mounted throughout on Timken bearings. The housing is a banjo pressing 5/32 in. thick, with a removable cover. The pinion, which is mounted on an adjustable sleeve, has ten teeth on all models. On the sedan the ring gear has 49 and on the other models it has 46 teeth. The axle shafts are chrome nickel steel, splined into the side gears and keyed to the wheel.

The front axle is tubular, being designed for great torsional strength, this being necessitated by the four-wheel brake equipment. It is of chrome-molybdenum steel, 2¼ in. in diameter, with forged spring seats and yokes. The wheel bearings are Timken, and there are ball thrust bearings in the steering knuckle head. The wheels are of the wood artillery type, but disk wheels are optional at a slightly increased price.

The Lockheed hydraulic four-wheel brake system is used, with external brakes front and rear. The brake drums are 14 in. in diameter and have 1½-in. brake bands. The hand brake is also external, operating on a drum at the rear end of the gearset. The drum is 7 in. in diameter, with a 2¼-in. band.

Steering is by worm and nut, the gear being semi-irreversible and adjustable for wear. The steering wheel is 17 in. in diameter and has an aluminum spider and an ebony-finished rim. The turning radius is 19 ft. 6 in. The steering knuckle pin axis produced intersects the center of tire contact on the ground. The springs are semi-elliptic front and rear. The front springs are 35 by 1¾ in., with seven leaves. The rear are 51⅝ by 2 in., with seven leaves on all models except the sedan, which has eight. The springs are parallel with the wheels and rear springs are under the frame at the rear, but, owing to the taper of the frame, are outside the channel rails at their front ends. The spring bolts are ⅝ in. in diameter and have bronze bushings.

The frame is of channel construction, the maximum depth of the side rails being 6 in. The stock is ⅛ in. and the frame has six cross members, including the banjo cross member, which acts also as rear engine support.

The bodies have steel panels over a hard wood frame. They have high sides and low seats, in accordance with the lines. The bodies provided are a standard four-door, five-passenger sedan; a special four-door, five-passenger sedan; a two-door, five-passenger brougham; a standard five-passenger phaeton; a special five-passenger phaeton and a two-passenger roadster with two auxiliary seats. Standard equipment includes Zerk chassis lubricating system, Gabriel snubbers all around, transmission lock, flush type ventilator, oil filter on engine, horn button, dimmer and special fittings, and accessories to accord with the requirements of the various bodies.

Wide Range of Automotive Products Exhibited at Belgian Show

Local manufacturers seek to recapture a part of light car market, taken by Americans and French since the war. Models not appearing at previous European exhibits include Imperia, with sleeve-valve engine and a six-cylinder Austro-Daimler.

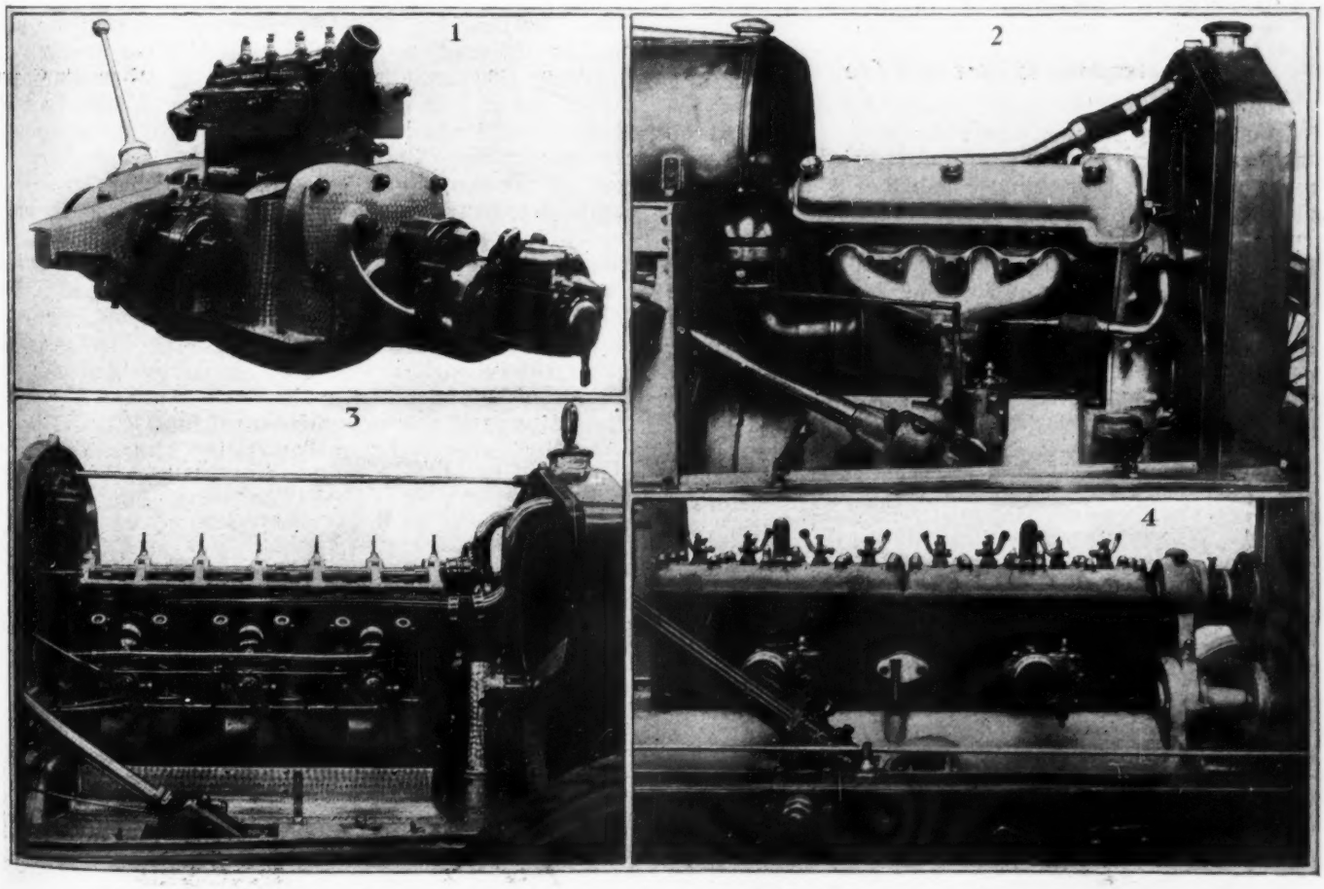
By W. F. Bradley

Brussels, Dec. 11.

THE Belgian show, now being held in the Palais du Cinquantenaire in this city, is the last of the European automobile exhibitions for the present season. Bigger than any of its predecessors, for a new hall has allowed the floor space to be increased to 378,000 sq. ft., the show unites 500 exhibitors and is devoted to every branch of the automotive industry. Passenger cars predominate, followed in importance by trucks, motorcycles, accessories and airplanes.

Unlike any other exhibition held on the continent of Europe, the Brussels show is really international and has an important American representation with Cadillac, Chevrolet, Buick, Oakland, Paige, Studebaker, Oldsmobile, Packard, Hudson, Essex, Willys-Knight, Lincoln and Ford. France and Italy are well represented with England and Austria having a numerically small representation. There are no German cars.

Business prospects looked bright with the opening of the show and even on the first two days there was a strong buying demand from the public. During the last few months imports have been high, particularly from America and Italy, in view of a threatened increase in import duties. Whether the present 20 per cent ad valorem duty will be increased, or whether it will be replaced by specific duties increasing the amount is not quite clear, but there is a general impression that whatever the change it will be equivalent to a 6 or 7 per cent rise. The present ad valorem duty is not looked upon with any great amount of favor by American importers, for it involves endless

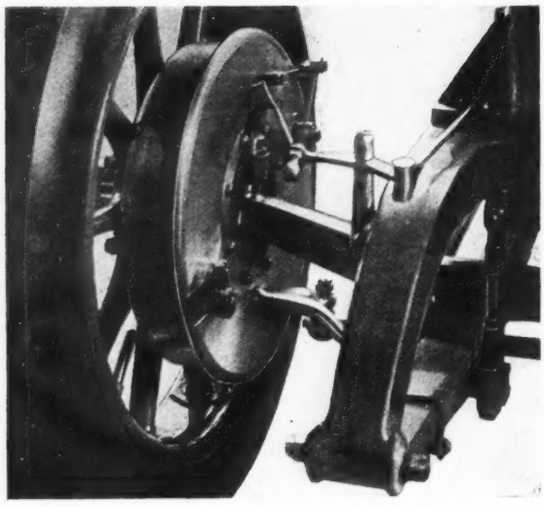


1—*Imperia four-cylinder sleeve-valve engine*

2—*Chiribiri 91 cu. in. short engine, a reproduction of a successful racing job*

3—*Excelsior high-grade overhead-valve six*

4—*Dunamis straight eight L-head engine*



Front wheel brake on Dasse car

discussion with the custom authorities on values and exchange rates. Whether the exchange rate shall be the one prevailing when the cars are shipped or on the day they reach Belgium is not clear, and importers claim that officials take the higher rate if there is any difference.

Technically the show reveals little that is new, for nine-tenths of the exhibits have been seen at London or Paris, and unlike any other exhibition the home firms are in a minority. Before the war the thirteen or fourteen manufacturers comprising the Belgian industry specialized on limited production high grade cars. Largely because of this, soon after the armistice, American makers were able to secure a position on the Belgian market which they have since consolidated, and the cheaper French cars took a big slice of the Belgian trade.

Imperia Is Low in Price

What looks like the most important attempt of the Belgian industry to recapture some portion of the cheap light car home market is that of the Imperia company with a new sleeve valve four-cylinder engine of 60 cu. in. piston displacement with two and four-seater bodies. It is intended as soon as the present series of big cars is exhausted to stop production on these and to specialize on the new light car. The outstanding feature of this job is the use of semi-circular sleeves let into the cylinder walls at opposite points and each set operated by a camshaft with double cams, one cam raising and the other cam lowering the sleeve. The cams give a rapid lift, a long dwell and quick closing.

The engine has block cast cylinders mounted on an aluminum crankcase, a detachable head, two ball bearings for the crankshaft, plain bearings for the rods, aluminum pistons, pump oil circulation with troughs, and a Scintilla tandem generator and magneto at the front end. The engine is a unit with the inclosed single plate clutch and the four-speed gearbox.

The rear axle has spiral bevel gear drive and is connected to the transmission by an open shaft with a couple of fabric universal joints. The cars will be produced with a four-wheel brake system, but at present this is applied only to the sporting models and the normal type has transmission and rear wheel brakes.

Jewel Another Small Car

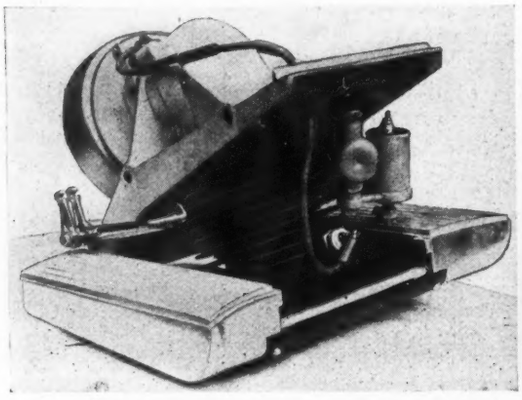
Another new attempt to provide a cheap light car is the Jewel, which has a four-cylinder L-head 2.36 x 3.94 in. engine, a three-speed gearset on the rear axle, and is listed at 17,650 francs with four-seater body.

There is a lower proportion of L-head engines in Belgium than in any country in the world. Dunamis, who is getting into production on a straight eight, has valves on one side; F. N. is changing over from the L to the I-head type; Minerva, the biggest maker, is producing sleeve valve engines exclusively, and all the others build the overhead valve type. The four is in the majority, followed by sixes, built by Excelsior and Minerva, and by one make of eights.

All Belgian cars now have four-wheel brakes. Excelsior took the lead immediately after the armistice, with the Adex system having diagonal control, a single cable from a left rear wheel going to a right front end and vice versa. Minerva is using the Perrot type; A. D. K., a new make, also has the Perrot; the F. N. Company has its own type with screw and nut on top of the steering pivot operating a wedge below the pivot and diagonal control as on the Excelsior. The half dozen others have their own individual types, for Belgium is distinctive in not having the uniformity of brake design which characterizes France.

Among the foreign cars not seen at other European shows was a new overhead six-cylinder Austro-Daimler with overhead camshaft and vertical shaft going through the rear of the cylinder block, and a cross shaft at the rear for the magneto and the generator. The fan on this engine is mounted on the front end of the camshaft, while the main air supply from the carbureter is from the base-chamber. The Austro-Daimler differs from the general European construction in having cylinders and upper half of crankcase in one casting, but it conforms to general practice in unit construction of engine and gearbox, center control, and a four-wheel brake system with the brake camshaft mounted in the front axle and two independent pairs of shoes in each rear drum.

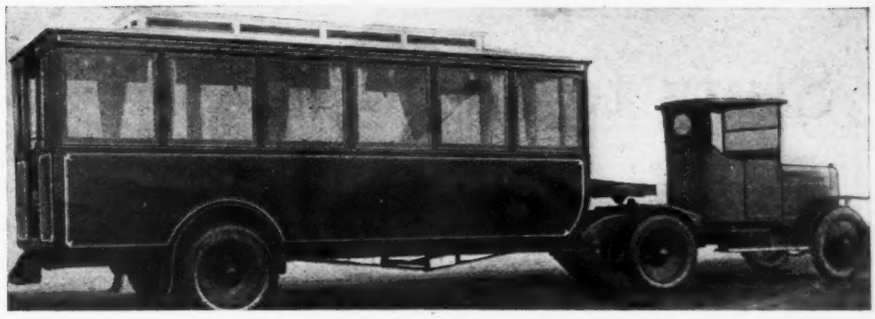
Chiribiri, one of the smaller Italian firms, exhibited a sport type two-seater with a commercialized reproduction



Inverted single-cylinder two-stroke engine used on Mondiale motorcycle

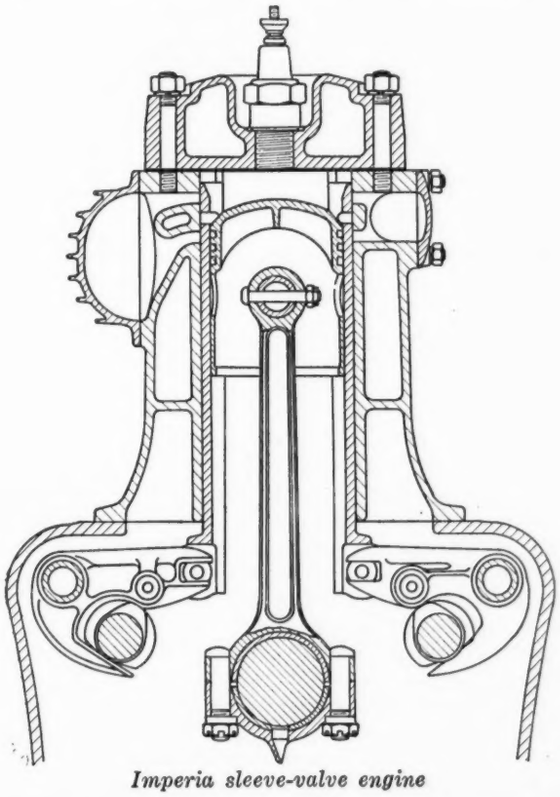
Mondiale pressed steel frame all enclosed motorcycle

of the 91 cu. in. four-cylinder racing engine which has been very successful in the past season's speed contests. While the original racer had steel cylinders with a welded-on jacket, the model offered to the public has cast-iron cylinders, two overhead camshafts with valves at 45 deg., a train of timing gears at the front, five-bearing shaft and the water pump at the front driven off one of the intermediate pinions. The fan is mounted on the pump shaft. The engine is claimed to develop 70 hp.



Auto traction 34-passenger trailer

Saloon and all-weather bodies were the feature of the body section of the show. The D'Ieteren Company, one of the leading Belgian firms, made a display of the Weymann type body, for which it has taken up a manufacturing license for Belgium. The public has not yet had any practical experience of this type of body and is merely in the expectant stage. Balloon tires were introduced by



Imperia sleeve-valve engine

Englebert and Jenatzy, the two Belgian makers, and were also shown by Michelin, Goodyear, Goodrich, Dunlop and Pirelli. No Belgian automobile manufacturer is offering balloon tires as standard equipment, although many are showing them on their cars and chassis and all appear willing to supply them if asked for by clients. The attitude of car manufacturers appears to be that these new tires will tend to interfere with their production plans and they therefore prefer to let the client ask for them.

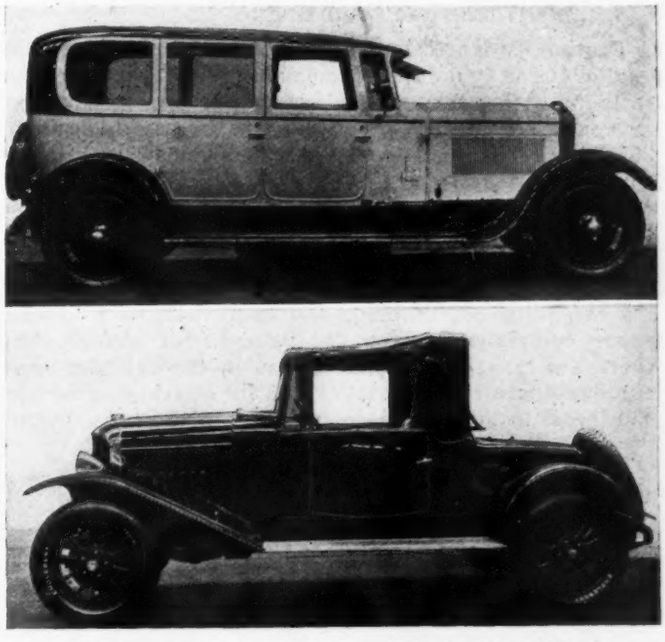
Trailers and semi-trailers were the feature of the commercial vehicle section of the show. The Auto-Traction Company, which is really the truck department of the Minerva Company of Antwerp, showed its short wheelbase pneumatic tired tractor with a self-hitching single axle omnibus trailer carrying 34 passengers.

The tractor, which has been on the market for a couple of years, has a four-cylinder Knight 3.54 x 5.52 in. engine, a unit powerplant and a bevel and internal gear rear axle. With guide rails at the rear, it can be backed under a single axle trailer, the front end of which is raised by a pair of castor wheels, and automatically locks the trailer to it and tucks the castor wheels between the frame members. This tractor has been used very successfully for some time for goods haulage, but its use for omnibus service is quite new. Excellent suspension is obtainable by trailer use, and it is claimed that the six-wheeler can be handled more conveniently in traffic than a normal two-axle bus of equivalent passenger carrying capacity.

The only novelty in the motorcycle section of the Brussels exhibition was a pressed steel frame, all inclosed motorcycle with an inverted single cylinder two-stroke engine mounted in a tunnel in the frame and driving to the rear wheel by a five-speed friction transmission and inclosed chain.

Mondiale Is Motorcycle Novelty

Put on the market under the title Mondiale, the engine has its 3 x 2 11/16 in. cylinder bolted to the under face of a slab-topped aluminum crankcase, forming an angle of about 45 deg. with the sheet metal underpan below the cylinder head. With the mouth of this turned forward and the two sides shut in by the pressed steel frame, a tunnel is formed which helps in cooling of the engine. The foot rests form a unit with the engine and are made use of as exhaust boxes, thus giving warmth to the rider's feet. The machine weighs 195 lb.



Above—D'Ieteren saloon on Fiat six-cylinder chassis. This is a good example of Belgian body design
Below—New Imperia two-seater with sleeve-valve engine

Stutz to Build Engine for New Model in Its Own Plant

Speedway Six is larger than Special announced last year. Both types will be continued, as will 4-cylinder car. Dimensions of cylinders are 3½ x 5 in. The compression ratio is 4.45 to 1. Balloon tires and four-wheel brakes are optional equipment.

By J. Edward Schipper

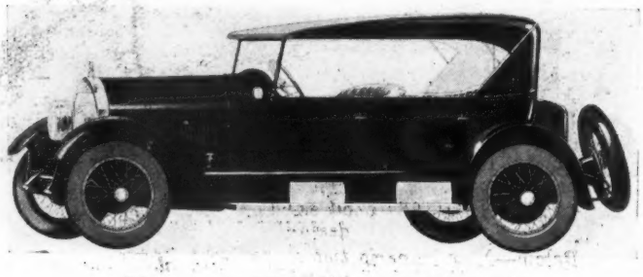
A NEW six-cylinder Stutz, known as the Speedway Six, has been brought out to form a companion model to the six-cylinder Special announced a year ago. The new car is larger than the Special, having a 10-in. longer wheelbase and a ⅛-in. larger cylinder bore. Its wheelbase is 130 in., the same as that of the four-cylinder model, which is to be continued, and its cylinder dimensions are 3½ by 5 in. Five body types will be mounted on the new chassis, two open and three closed. Four-wheel brakes and balloon tires are optional equipment. Prices are to be announced later.

The new car has been in preparation by the Stutz company for over a year, during which time the manufacturers have been testing the new product on the Indianapolis Speedway. A number of the cars have been driven wide open on breakdown tests to prove out parts, as well as the oiling system which has been adopted for this engine. The engine has been particularly adapted to manufacture in the Stutz plant, which has been completely retooled for this new unit. The bodies are characteristic of the Stutz line, with modifications and refinements to bring them in accord with present style in appearance and equipment.

Valve-in-head Engine Used

The powerplant comprises a block-cast, valve-in-head engine of 288.6 cu. in. displacement. With a compression ratio of 4.45 to 1, giving a compression pressure of approximately 75 lb. per sq. in. gage, the engine develops 35.5 hp. at 1000 r.p.m. and a maximum of 80 hp. at 3100 r.p.m. With 32 by 4½-in. tires and the standard gear ratio of 4.9 to 1, the maximum speed of the fully loaded touring car is in excess of 70 m.p.h., as confirmed by tests made on the Indianapolis Speedway.

The cylinders and crankchamber are a one-piece casting extending 2¼ in. below the crankshaft axis. Jacket space completely surrounds the cylinder barrels, and there are large water spaces also in the cylinder head surrounding all gas passages and the spark plug bosses. The head is held in place by alloy steel studs, evenly spaced around the cylinder bores. A cast aluminum oil pan is bolted to the bottom of the block casting, and a standard bell housing to the rear.



Phaeton model of Stutz Speedway Six

The pistons, which are of cast iron, are 3⅞ in. in length, 1¾ in. of this length being above the piston pin axis, and the piston head is domed ¼ in. The pistons may be removed from the cylinders at either top or bottom. At their top end the pistons are made with a clearance of 0.013 in., while on the skirt the clearance is only 0.003 in.

Four Concentric Piston Pins Fitted

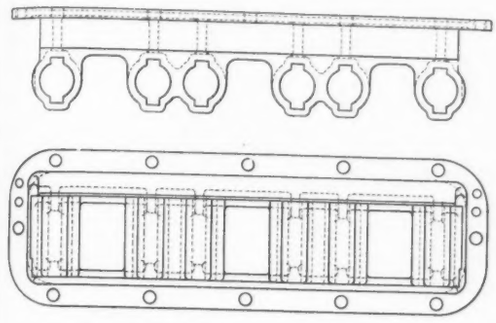
Six 3/32-in. drain holes help to prevent oil pumping. Four concentric piston rings are fitted, all above the piston pin, three being of ⅛-in. width, and the fourth, an oil regulating ring, of 3/16 in. Two oil grooves are cut in the skirt of the piston, one at the piston boss axis and the other 1⅜ in. below. With its rings and pin the piston weighs exactly 2 lb. The tubular ⅞-in. diameter piston pin floats in the piston and the connecting rod, and is provided with Tobin bronze buttons in its ends, which bear against the cylinder walls. Its bearing in the connecting rod is 1½ in. long.

The connecting rods, of standard design, measure 12 in. between centers and complete with cap and bearing bushings they weigh 3 lb. 14 oz. There are no oil grooves in the big end bearing, which measures 2½ in. in diameter and 1½ in. length. Oil is conducted to the piston pin bearing through a drilled oil hole on top of the rod. During the assembling process the rods are selected in sets of six, the variation in total weight being held down to ½ oz., while no tolerance whatever is allowed on the weight of the upper end.

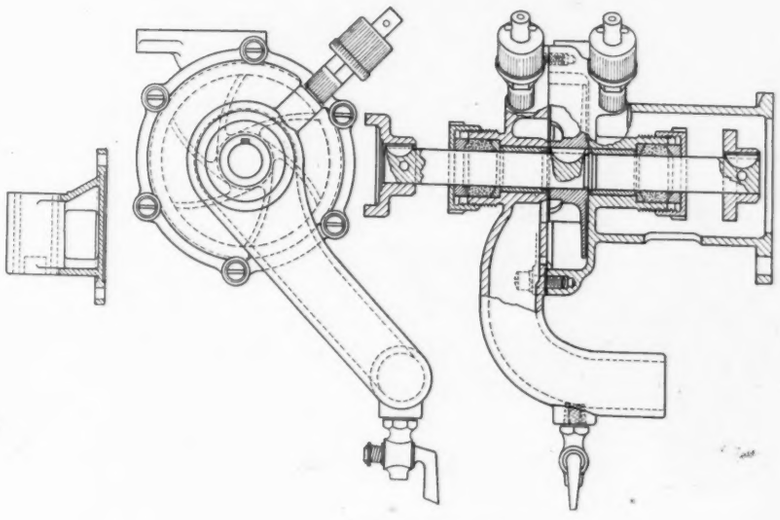
The crankshaft is of the three main bearing type and is mounted in bronze-backed, babbitt-lined, shimless bearings without cross-feed oil grooves. All bearings are 2½ in. in diameter, the lengths of the three main bearings being 2⅛, 2¾ and 2¾ in., front to rear, respectively. No section of the crank arms is smaller than 4 sq. in. At the front end there is an adjustable thrust bearing by means of which any end play can be taken up. Counterweights are forged integral with the shaft, which latter is drilled with oilways for the lubrication of the crankpin bearings.

A Link-Belt silent chain of ⅜-in. pitch and 1½-in. width is employed for the camshaft and accessory shaft drive. The layout is triangular and an automatic back type Link-Belt idler is inserted in the line to take up chain slack. Crankshaft, accessory shaft and idler sprockets are of steel, while the camshaft sprocket is of semi-steel. The camshaft, which is made of No. 1010 steel, has a nominal diameter of 1 7/16 in. and is

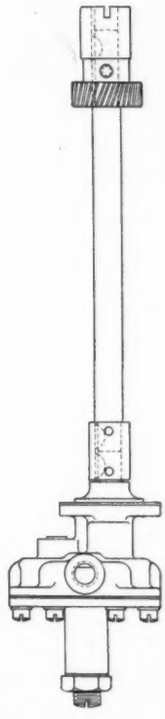
Design Features of New Stutz Speedway Six



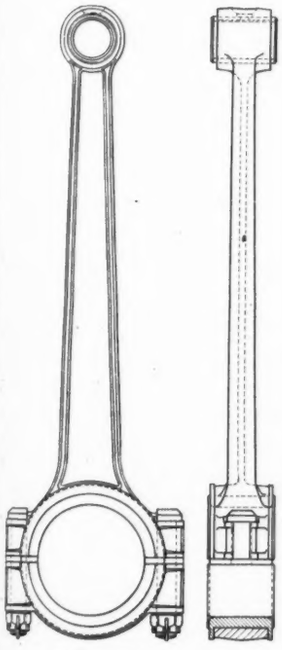
Valve tappet guide bracket



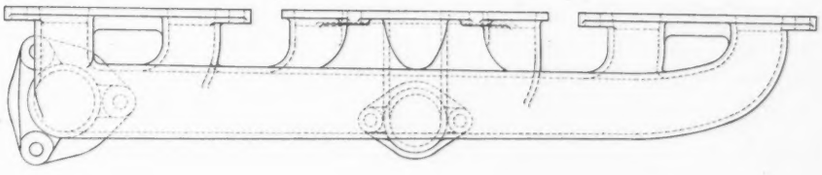
(Above) Water pump

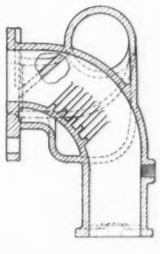


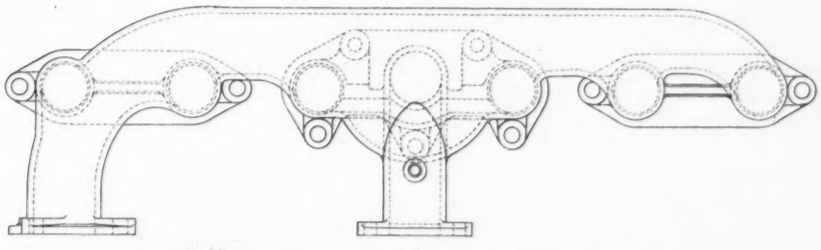
Oil pump and drive shaft



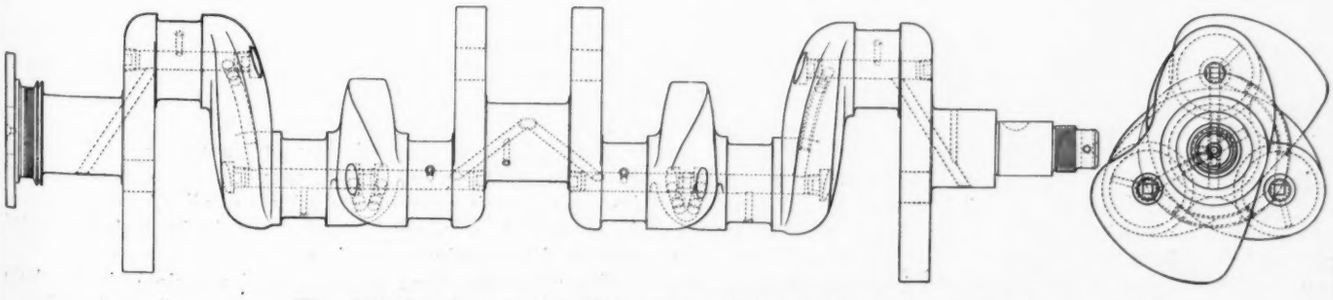
Connecting rod



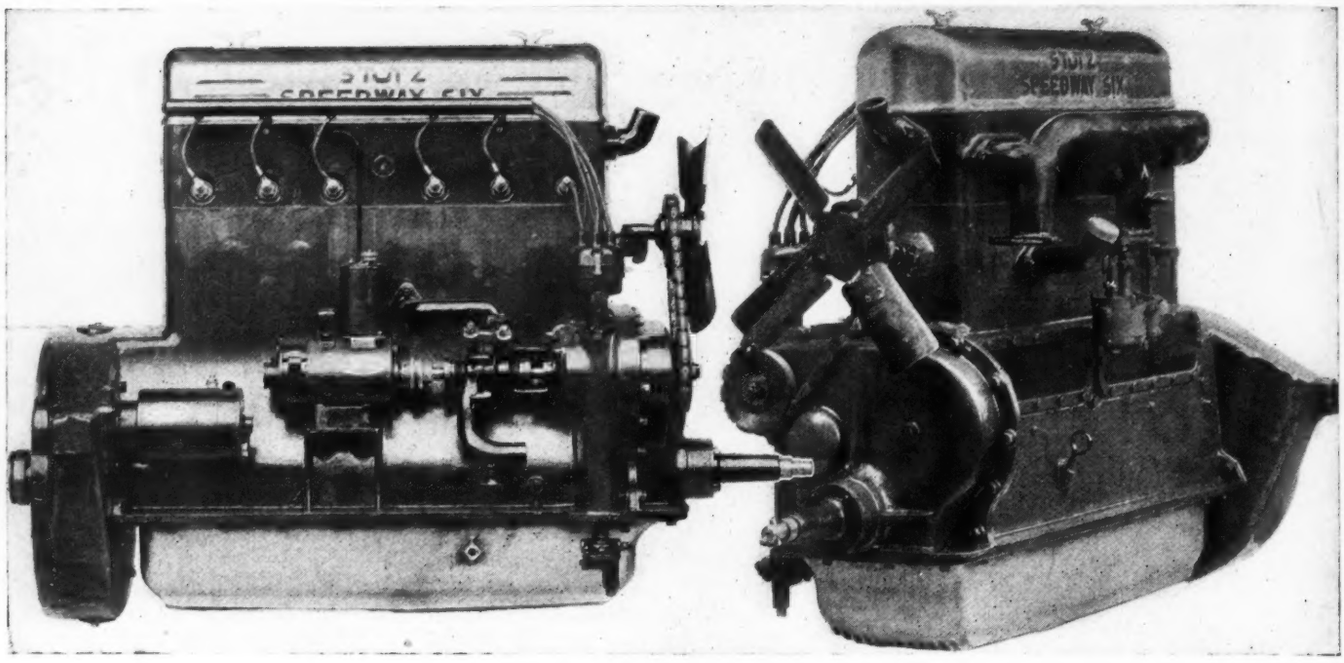




(Below) Combined inlet and exhaust manifold



The three-bearing, counter-balanced crankshaft drilled with oil ways



Two views of powerplant which is to be built in Stutz factory

mounted in three bronze-backed, babbitt-lined bearings of the following dimensions (diameter and length): front, 2 5/16 by 1⅞ in.; center, 2¼ by 2 in.; rear, 1¾ by 1¾ in. Owing to the fact that the bearings decrease in diameter from front to rear it is possible to withdraw the shaft from the front end. End thrust on the camshaft is taken on the front bearing, which has means for adjustment.

Tappet Guides Cast on Flange Plates

Roller tappets are used, the hollow roller pins being cross-drilled for lubrication purposes. The tappets are 1 in. in diameter by 2¾ in. in length, the rollers 1 7/16 in. in diameter by ⅜ in. in width and the pins ½ in. in diameter. Guides for the tappets are cast on flanged plates which are doweled to the outside of the crankcase, the openings over which they are bolted permitting of inspecting the crankshaft, connecting rod and camshaft bearings. When the plates are removed the entire bore can be inspected by the use of a small mirror. Rotation of the tappets in their guides is prevented by the provision of the latter with slots in which the roller pins slide.

Steel tubing of ⅜-in. diameter and 1/16-in. wall thickness is the material from which the pushrods are made. These rods have one ball and one cupped end, the joints being lubricated by the oil overflowing from the rockers. When the engine is in operation, oil fills the cup at the top of the rod, runs down on the outside of the rod to the cup on the tappet and overflows through oil holes onto the rollers. As an aid in keeping the valve stem clearance constant and in silencing the valve action, the rods are inclosed within the cylinder block. There is a rocking contact between the rockers and the valve stems, which is lubricated by a felt ring.

It is stated that the slippage at the valve stem contact amounts to only 0.008 in., which is equal to 2.7 per cent of the rocking motions. The arms of the rocker are of unequal length, 1⅜ in. of the total length of 2 in. being on the valve stem end, thus multiplying the cam motion in a considerable ratio. The rockers are mounted on a ⅞-in. hollow shaft carried in three brackets. Pressure lubrication is provided for the rockers, which carry the valve adjusting screws. An aluminum cover incloses the rocker mechanism.

While the inlet and exhaust valves are of the same size, 1 23/32-in. head diameter by ⅜-in. lift, they are made of different materials, the inlet valves being made of tungsten steel and the exhaust of chrome-silicon steel. Dual springs with a combined pressure of 60-65 lb. are fitted, and all valves are arranged in line in the cylinder heads. The firing order is 1-4-2-6-3-5.

Constant acceleration type cams are used and the valve timing is as follows: Inlet opens 10 deg. late and closes 45 deg. late; exhaust opens 45 deg. early and closes 5 deg. late. On the accessories drive shaft is cut a helical gear for driving the oil pump and the ignition unit. This shaft carries the fan pulley and the chain sprocket at its forward end and a slotted disk forming one member of a Hookham joint for the water pump drive at the rear end.

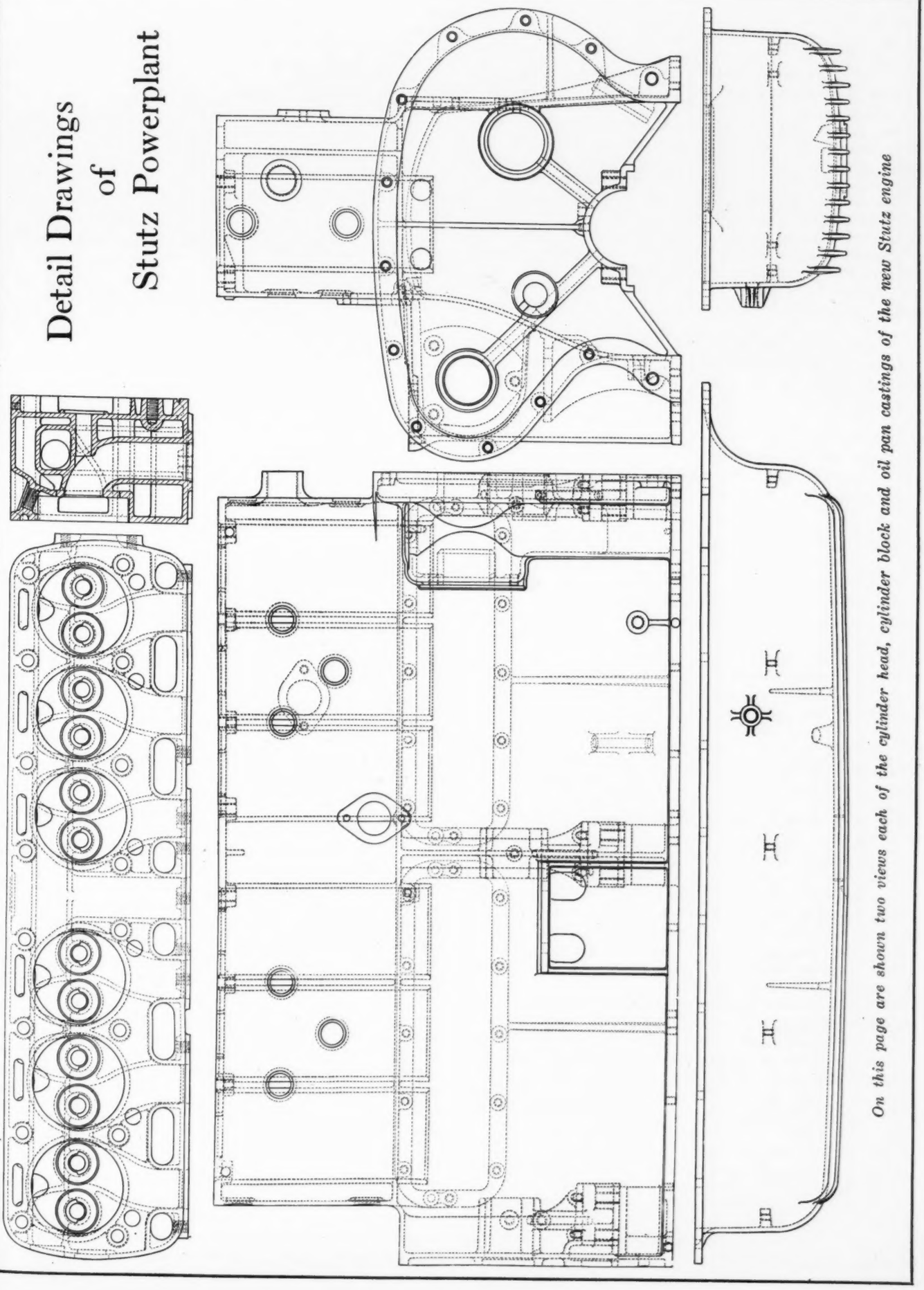
Lubrication is by pressure, the oil being contained in a cast aluminum pan with a capacity of 3 gal. An antisplash plate and baffles in the pan prevent splashing and surging of the oil, and cooling ribs on the bottom of the pan keep down its temperature. The gear type oil pump, which runs at one-half crankshaft speed, is provided with an adjustable pressure regulator in its cover. Pump and driveshaft form a removable unit mounted underneath a portion of the crankcase overhanging the oil pan.

Pump and Driveshaft Removable

An advantage of this location is claimed to be that it is only necessary to remove the pump cover in order to get at the pump working parts and the regulator. Although the inlet of the pump is located 2¼ in. above the normal oil level, no priming is required. Oil is fed through large diameter tubes outside the crankcase to the main bearings, through oilways drilled in the crankshaft to the crankpin bearings and through a drilled hole to the camshaft bearings.

The oil leads also carry oil to the rocker shaft, chain idler and accessory drive shaft. The radial oil holes in the crank pins are located on the side where the bearing

Detail Drawings of Stutz Powerplant



On this page are shown two views each of the cylinder head, cylinder block and oil pan castings of the new Stutz engine

load is a minimum. Cylinders, piston pins and other moving parts are lubricated by spray and overflow. The oil pressure regulator is adjusted to maintain the pressure at 15-25 lb. per sq. in., and no provision is made to vary the pressure in accordance with the throttle setting or the manifold suction.

Cooling water is circulated by a centrifugal pump driven at one and one-quarter times crankshaft speed. This pump is 3¾ in. in diameter and has a bronze impeller with six vanes. The pipe through which the water enters the jacket has a blind end and the water leaves it through holes on opposite sides near the end, which tends to insure uniformly distributed flow through the jacket. A stainless steep pumpshaft is used, obviously to prevent rusting, and lubrication of the pump is by a compression grease cup in the usual way. The 16-in. fan, driven by a silent chain at one and one-quarter times crankshaft speed, has a self-lubricating bearing.

Electrical Equipment

All of the electrical equipment is of Remy make. The starting motor has a No. 1 S. A. E. outboard flange mounting on the No. 3 bell housing and driven to the flywheel of the engine through a Bendix drive. The ignition coil is mounted on top of the generator. Semi-automatic control is provided for the ignition, the ignition unit being located in line with the oil pump and driven from the accessories drive shaft through the same set of gears.

A supply of 18 gal. of gasoline can be carried in a tank at the rear of the chassis, which is supported on the frame at three points. Fuel feed is by the Stewart vacuum system to the 1½-in. vertical type Stromberg carbureter. The intake and exhaust manifolds are cast in one piece and provide a hot-spot to assist in the vaporization of the fuel. There are five vaporization wells in the inlet manifold.

Special emphasis is laid by the makers on the accessibility of the engine. The following units can be removed without disturbing any other parts: Starting motor, generator, distributor, oil pump, oil pan, carbureter, fan belt, valve rocker shaft assembly, pressure regulator, water pump delivery pipe, oil filler, oil strainer, oil pump cover assembly, inlet and exhaust manifold and ignition cable tube.

The semi-steel flywheel, which weighs 65 lb., is cut with teeth for the starter drive and is designed to take a 10-in. Borg & Beck clutch. The gearset is a Warner. Both the clutch and the gearset have some special features, however, the former having ground mats and a thrust bearing and the latter a Strom bearing on the tailshaft instead of the bearing usually fitted at this point. Ball bearings are also fitted at the forward end of the primary shaft and Hyatt roller bearings on the secondary shaft of the gearset.

From the gearset the drive is transmitted through two Mechanics Machine Co. No. 5 universals and a 2¼-in. hollow propeller shaft to the Timken rear axle. Torque reaction is taken on a pressed steel torque arm 54¼ in. long and made of 7/64-in. stock, while the driving thrust is taken on the springs. Semi-elliptic springs are used all around, 38 by 2 in. in front and 62 by 2¼ in. in the rear.

Mention has already been made of the fact that an option is given purchasers on four-wheel brakes. If these are wanted, the Lockheed front wheel hydraulic brake system is used, with brakes of the external or contracting type. The brakes are 15 in. in diameter by 2 in. face, and the master cylinder is mounted on the bell housing. Ordinarily the conventional interior and external brakes are fitted to the rear wheels. The steering gear is a Gemmer Model M. On the open cars 32 by 4½-in. tires are fitted and on the closed, 33 by 5-in. Six-inch balloon tires are offered as optional equipment at extra cost. Houk wire wheels are standard equipment, the model B-5 being used, which has the largest hub used with wire wheels.

The frame rails are made of 5/32-in. stock and are 7 in. deep at the middle of their length. Counting the bell housing with the supporting arms as one, there are eight cross-members, of which three are tubular, from which it is apparent that special efforts have been made to secure rigidity.

All five body types, including five- and seven-passenger phaetons, a five-passenger sport brougham, a seven-passenger Berline and a five-passenger Suburban, are mounted on the same chassis of 130-in. wheelbase. All of the closed models are of the four-door type. The equipment includes a Stewart-Warner speedometer, Western ammeter, U. S. oil gage and Boyce Motometer. Tools are carried in a pocket on the left front door, and on the open cars the side curtains are stored in a compartment back of the rear seat.

The tops provided on the open cars are of the five bow, collapsible type. The steering wheels are of full wood and the usual center control is provided. There are kick plates on the full length, steel running boards. The instrument board is of solid walnut. The car has a road clearance of 9½ in., the lowest point being at the middle of the front axle.

Gas Produced from Straw

EXPERIMENTS have been carried out by the Department of Agriculture on the production of combustible gas from straw, chiefly with a view to the use of such gas for fuel and motive power purposes on the farm. The tests were made at the Arlington Experimental Farm in Virginia and are reported upon in Department Bulletin No. 1203, "Experimental Production of Straw Gas," by Harry E. Roethe.

Although the conclusion is drawn that "the destructive distillation of straw and similar material for the production of gas on the farm is not practicable," the results are of interest from a scientific standpoint.

A very satisfactory gas was obtained from wheat and oat straw and also from corn stalks. A ton of sun-dried wheat straw gave approximately 10,000 cu. ft. of purified gas, 625 lb. of carbon residue, 10 gal. of tar and a large quantity of ammoniacal liquor. The gas has a heating value of about 400 B.t.u. per cu. ft. and its average composition is about as follows: Carbon dioxide, 30 per cent; carbon monoxide, 26 per cent; hydrogen, 26 per cent; methane, 15 per cent; other hydrocarbons, 1.5 per cent; nitrogen, 1 per cent; oxygen, 0.5 per cent.

Straw gas has possibilities as a fuel for propelling automotive vehicles, but under present conditions it is improbable that it will be used to any extent in such a manner. Automobiles have been operated on this gas carried in a flexible, impervious bag attached to the car. A bag containing 300 cu. ft. of gas held a supply sufficient to run the car for 15 miles. This method, however, is unsatisfactory and impracticable.

The most advantageous utilization of the by-products probably is on the farm where the grain is produced. As a fuel the carbon residue has a heating value of approximately 10,000 B.t.u. per pound, while as a fertilizer its average composition is about 5 per cent potassium oxide (K_2O), 1.5 per cent ammonia (NH_3), and 0.3 per cent phosporic acid (H_3PO_4). The tar can be used satisfactorily as a wood preservative and disinfectant.

Traffic Surveys Reveal Efficiency of Truck Haulage

Study of California and Connecticut tests shows reasons for seasonal fluctuation in use of commercial vehicles. Economic distances and functions determined

By Henry S. Trumbower,
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WITHIN the last year or two the Government has cooperated with State highway departments in making extensive traffic surveys. It was recognized that a large amount of highway transportation data had to be obtained in order to provide for an authentic basis for analysis and for a formation of intelligent policies to govern the transportation of freight and passengers over our highways for the future.

A year's census of the traffic was made in the State of California and full data were also obtained of the traffic on the Connecticut highways for a three-months period in the fall and winter of 1922-23. The preliminary survey in Connecticut has been followed by a full year's census, the results of which are now in the process of preparation.

As is to be expected, traffic surveys show that there is a substantial variation in the motor vehicle traffic in comparing the summer season with the winter months. The California traffic census indicated that the winter traffic was approximately 77 per cent of the summer traffic; truck traffic in the winter months was but 55 per cent of the traffic occupying the highways in the summer. Practically similar variations are noted in the automobile and truck traffic on the Connecticut highways.

The reasons for this fluctuation in truck traffic are in all probability different. In California a large part of the truck movement is caused by the marketing of agricultural products. The traffic counts easily indicate the importance of the motor truck during the period of harvest and crop moving. The falling off of the truck traffic in Connecticut during the winter months is no doubt in large part due to the severe weather conditions which are likely to prevail at that time. This past winter was most unusual in that respect on account of the heavy and frequent snowfalls.

Trucks Move Crops

The fact that the movement of crops had a large effect on the California truck traffic was evident, inasmuch as there was noted an almost abrupt diminution of truck traffic in the months of September and October, when the harvests were over. In California it was also noticed that truck traffic was extremely sensitive to rain; very little hauling of crops took place during wet weather. As soon as the weather cleared there was an upward swing in the movement.

Truck traffic in California was found to be fairly uniform during the period from Monday to Friday. About 15 per cent of the total weekly traffic was registered on each one of these days. On Saturday the truck traffic fell to 12 per cent and on Sunday it was but 8 per cent, or just about half of the normal truck traffic observed during the early days of the week. This reduced truck traffic on Saturday and Sunday relieves, at least to that extent, the congested conditions of the highways on those week-end days. In California it was found that 42 per cent of the total average weekly traffic moved on Saturday and Sunday; 25 per cent of the total weekly traffic was recorded on Sunday alone. It would appear from general observation that this is an index of conditions in general.

In the Connecticut survey a study was made of the hourly variations in truck traffic. After 6 a. m. it increases very fast, reaching a peak at the 10-11 o'clock period; a second peak occurs between 1-2 o'clock equally as high as the morning peak. After 5 o'clock in the afternoon the falling off of the motor truck traffic is most rapid. The movement after 8 o'clock in the evening consists largely of long-distance trucks carrying special commodities. It may be stated in this connection that the per cent of overloaded trucks was found to be much larger at night than in day time.

Mileage Zones Determined

It is impossible to determine with exactness the definite mileage zones for motor truck operation. There are a great many elements which affect the limits of economic hauling, such as the nature of the commodities hauled, the efficiency of the competing railroad service, the character of the highways, and the distribution of centers of population. The Connecticut and California surveys showed the following percentages of truck movements in the various mileage zones:

	Connecticut	California
Less than 30 miles	67.4%	58.0%
From 30 to 69 miles	18.4%	23.5%
Over 70 miles	14.2%	18.5%

The difference of the movements in these two States is largely accounted for by the greater distances between towns and market centers. At the time when this Connecticut count was taken there were more or less delays and uncertainties connected with railroad freight shipments. Later studies, made at a time when the railroad service was more nearly normal, showed that the per cent of truck movements within the 30-mile zone was somewhat larger than 67.4 per cent. Interviews with shippers lead one to conclude that rates are not as important factors as the matter of time and service in determining whether a given shipment would move by rail or by motor truck. The investigations made in Connecticut indicate that longer distance truck transportation increases perceptibly at times of rail congestions and embargoes.

An analysis of the Connecticut traffic data shows that the per cent of trucks of ½-1½-ton capacity decreases with the increase of the mileage, while the percentage of trucks of larger capacities tends to increase in the higher mileage zones.

Where long hauls are involved, large capacity trucks are more generally used.

Differences in Connecticut and California traffic are observed not only as to the relative amount of motor truck operation in the several mileage zones, but also with reference to the kind and character of commodities transported. The commodities transported are classified as follows:

	Connecticut	California
Manufactures	73.6%	48.5%
Agricultural	8.5%	23.0%
Mines	6.7%	15.0%
Animals	7.1%	7.0%
Forests	4.1%	6.5%
	100.0%	100.0%

It must be admitted that manufactured products lend themselves most readily to motor truck transportation because of their comparatively small bulk and high value. Larger profits can be earned by motor truck operators in transporting commodities of this kind than in the hauling of more bulky and less valuable products of the field, forest and mine.

Return Loads Needed

To make the best economic showing it is generally recognized among motor truck operators that a return load is necessary. The results of both the Connecticut and California surveys indicate that the load factor of motor trucks is still far from 100 per cent. In Connecticut it was recorded that two-thirds of all the motor trucks on the highways were operated under a load, and one-third was empty. In California it was noted that 55 per cent of all the trucks were loaded and 45 per cent were operated empty. In both States the traffic records show that the percentage of empty trucks was substantially higher in the low mileage zones than in the higher mileage zones.

It is evident that for the lighter truck and for the short distances the return load is not so necessary for economical hauling as it is for the larger trucks traveling over long routes. The high cost of operation of the heavy trucks tends to require, for profitable operation, a return load. In traffic areas where the manufacturer and producer or the merchant does his own hauling by truck, the "in" and "out" loads are necessarily not as well balanced as they are where a large part of the motor trucking is carried on by organizations engaged in common carrier service.

Such groups are apt to maintain central collecting stations at the terminal points and special efforts are made to round up freight for return trips. Few of the manufacturers who use trucks to distribute their product are able to find the raw materials at the points of consumption or delivery for a return load.

There has recently been made by the Department of Agriculture in cooperation with the Massachusetts Division of Markets a cost study of the transportation of Franklin County apples to market by motor truck. Franklin County is located in the extreme northwestern part of Massachusetts and is well known for its large and splendid apple crops.

Most of the shipments in the past have been made by rail from a station called Shelburne on the Boston & Maine Railroad. Comparisons of rail shipments and motor truck shipments were made as to distance, time, rates and costs. Cities like Holyoke, Springfield, Worcester, Boston, Hartford and Providence were taken as marketing points. Railroad shipments were classed as carload (c.l.) and less-than-carload (l.c.l.).

The delivery time of the motor truck was in every case less than that of the railroad. A l.c.l. and a c.l. movement to Springfield, 44 miles away, took 28 hr. by railroad; a 3½-ton truck could go that distance in 4 hr.; a smaller truck in even less time.

To Boston (114 miles) a l.c.l. movement is was estimated would take 50 hr., and a c.l. movement 32 hr.; by motor truck it would take 12 hr. with a 3½-ton truck and 16 hr. with a 5-ton truck.

On the basis of freight charges, including terminal pick-up and delivery expenses, it was estimated that a 1-ton truck, owned and operated by the grower, could compete with railroad shipments up to a distance of approximately 22 miles on carload rates and up to a distance of about 30 miles on less-than-carload rates. It was assumed in these cases that the truck had no return load.

Time Saving Important

It was estimated likewise that a 3½-ton truck, commercially owned and operated, could compete with c.l. shipments up to a distance of 42 miles and with l.c.l. shipments up to 70 miles; the 5-ton truck could compete with carload shipments up to a distance of 48 miles and with l.c.l. shipments up to 80 miles.

If it is assumed that the trucks have a profitable return load the economical operating area is considerably extended. Under those conditions it was estimated that a 1-ton truck could compete with carload shipments up to 81 miles; a 3½-ton truck could compete with c.l. shipments up to 95 miles, and up to 150 miles with l.c.l. shipments; a 5-ton truck could compete with c.l. shipments up to 105 miles and with l.c.l. shipments up to 170 miles. These comparisons, it must be observed, are wholly paper comparisons, based upon given freight rates and estimated truck-operating costs. The time element and distances to be traveled tend to modify these competitive areas. It is to be noted that motor truck trips to Worcester, a distance of 86 miles, would take about 12 hr. with a 5-ton truck and 8 hr. with a 3½-ton truck. Trips as far as Worcester and to points beyond would as a regular matter take two days and would thus add to the operating costs.

The conclusions arrived at in that study were that a 1-ton truck could be operated advantageously to transport supplies from Shelburne to Worcester, 88.9 miles, when the truck had a return load and when it was in competition with l.c.l. railroad rates. It was estimated that a 1-ton truck could make the round trip that distance in a day. The 3½-ton and 5-ton trucks could be advantageously used in transporting apples as far as Holyoke, 35.3 miles, and Springfield, 44 miles, because these trips could be made in a day.

In a recent investigation of terminal marketing conditions, made by the Government in cooperation with the Port of New York Authority, special attention was paid to the time required to move fruits and vegetables from the piers to the commission merchants and dealers. In that case it was observed that comparatively few motor trucks are engaged in this service. Based on a limited amount of data, certain horse-drawn truck costs and motor truck costs were tabulated. The following costs were found, based on a 10-hr. day:

1-horse truck	$1.10–$1.15 per hour
2-horse truck	1.25
2-ton motor truck	1.50- 1.60 per hour
5-ton motor truck	2.65- 2.75 per hour

Although the per hour costs for trucks are, according to those figures, somewhat higher than the horse-trucking costs, motor trucks, because of other advantages, would find much wider use if there was not such a great loss of time through congestions at the loading docks.

A study was made of the activities of several trucks and it was found that about 6.14 per cent of an 11-hr. period the trucks were standing idle; the loading took 3.8 per cent of the time, moving 20.1 per cent, and business 4.7 per cent.

Better Loading Facilities Advocated

A more systematic arrangement of the loading platforms and more orderly movement of the produce from the freight cars to the waiting trucks would without question cut down this proportion of idle time very considerably and would allow the motor trucks to operate with a much greater degree of economy.

The traffic survey of California indicated to what extent the transportation of passengers and freight over the highways of the State had become an organized enterprise. There were found to exist 719 motor vehicle lines of all sorts, operating under public convenience and necessity permits issued by the Railroad Commission and coming within the control of that regulatory board as to both rates and service.

Some of these lines carry passengers exclusively, others passengers and express, others passengers and freight, and many freight only. A checking of the annual reports filed with the State authorities revealed the fact that there were 61 passenger lines and 50 freight lines (111 out of the 710, or 15 per cent of the total) which reported an annual gross revenue of $20,000 or over. Those in this class may be grouped as follows:

Group	Number of Passenger Lines	Number of Freight Lines
$20,000–$40,000	26	18
40,000– 60,000	9	11
60,000– 80,000	7	7
80,000–100,000	2	3
Over 100,000	17	11
	61	50

Earning Capacity

The total operating revenues for these 61 passenger lines were $7,950,000, or an average of $130,327 per line. The 50 freight lines reported total revenues amounting to $3,390,000, or an average of $67,800 per line.

Information and data are lacking for the determination of the average earnings per vehicle.

The magnitude of the business of some of the larger lines is revealed by the fact that the 17 largest passenger lines showed an estimated average revenue of $355,000 per line, the 11 largest freight lines showed $140,000 as the estimated average per line. The organized passenger carrying business has been developed to a much greater extent than the freight business. Freight handling by common carrier motor trucks is a comparatively recent development.

The length of the routes of these California bus lines vary considerably. The average length is 43 miles; 50 per cent of the lines cover 30 miles and under.

How rapid the increase in this type of transportation has been is evidenced by the fact that in 1920 there were a hundred lines operating and in 1922 the number of lines had increased to 246, an increase of 146 per cent. In the routes 50 miles and less in length the increase was from 74 to 175 lines, or 136 per cent; in the routes 50 to 100 miles long there was an increase from 22 to 48 lines, or 118 per cent; in the 100 to 200 mile zone the number of lines had increased from 3 to 19, or 533 per cent, and in the 200 miles and over zone there were 4 lines instead of only 1, or an increase of 300 per cent.

Although the largest number of lines were added to the first 50 mile zone, nevertheless the greatest relative increase is in the routes of greater distances, which tends to show that long distance traveling by motor bus seems to be well established in California and is becoming more important.

The fare schedules of 232 motor bus lines ranged from 1 cent to 13 cents a mile; the average rate per mile is 5.4 cents. As a matter of fact, half of the lines charge rates which amount to 5 cents and less per mile, and half charge fares which exceed 5 cents a mile. The low rates (2 cents and less) are almost wholly found in large cities, where there is keen competition among different transportation agencies and where the motor buses are carrying capacity loads. The high rates of 10 cents and more per mile are usually charged in mountainous country or over roads of inferior quality.

The Government has recently undertaken to make a number of intensive investigations relating to the transportation of various agricultural commodities over our highways and the marketing of them. A survey of the transportation of milk by motor truck from the producer to the city dealer is now in progress, taking up the transportation of milk in the Baltimore milk shed as the first one. The preliminary field reports show the extent to which milk is now being brought in from the farm by motor trucks.

Milk Hauled in Trucks

In 1919, 18 per cent of the milk supply of the city of Baltimore was brought in by motor truck; the 1922 figures show that 36 per cent was brought in by that method. The remaining 64 per cent is shipped by rail. For the past three years the rail shipments have remained practically constant, whereas the motor trucks have taken care of the increased amount consumed.

It appears from the investigations made thus far that the use of the trucks over improved highways was instrumental in the opening up of new areas of milk production. The movement of milk in large quantities by motor truck is a comparatively new development. The first truck shipments were recorded in 1915, when 751,990 gal., or 6 per cent of the total supply, were shipped in that manner. At that time 18 per cent, or 2,190,000 gal. was transported by wagon and 75 per cent by rail.

New Glycerin-Water Quenching Medium

IN connection with the Bureau of Standards' investigation of steels for the manufacture of precision gages, an effort has been made to find a quenching medium intermediate between oil and water. During the past month, quenching curves were taken of specimens cooled in water solutions of glycerin. Such solutions fill the gap effectively, so far as the cooling rates at high temperatures are concerned. On the other hand, glycerin and its water solution cool distinctly faster in the lower temperature ranges than quenching oil. This appears to be a desirable property. As a commercial quenching medium glycerin or its water solutions should not be unduly expensive, for although the first cost is high, glycerin does not decompose to any great extent on heating, as is the case with oils. The composition of glycerin water solutions may be easily maintained by hydrometer tests. They do not give off irritating fumes and are harmless to the worker, in contrast with concentrated sulphuric acid sometimes used for this purpose.

Packard Adopts Four-Wheel Brakes on Single Six

External contracting type with half-wrap are used on back wheels and internal expanding shoes on front. The equipment includes bar type equalizers, located between front and rear operating systems. Inside diameter of drums is about 14 in.

FOUR-WHEEL brakes and a number of detail refinements are incorporated in the new series Single Six made by the Packard Motor Car Co. In a general way the chassis and bodies are quite similar to the previous series, the outstanding change being the addition of fully equalized mechanical four-wheel brakes. Long and short wheelbases (133 and 126 in.) are continued.

Another feature is the removal of the battery box from under the body and its installation in a metal container set into the right front fender guard just ahead of the forward end of the running board. To remove the battery, an aluminum cover plate is first taken off and the clamps engaging with the battery box handles are then freed. Instead of removing the terminals from the battery posts, short leads from these posts to screw terminals of the ground connection and the starting motor line are disconnected. This arrangement was adopted because a similar installation on the Straight Eight elicited very favorable comment.

Full equalization of the four-wheel braking system is obtained by the use of bar type equalizers which are located between the front and the rear operating systems and between the two sides of each system. External contracting brakes with a half-wrap are used at the rear, and internal expanding shoes are used at the front axle.

The operating mechanism is so proportioned that 68 per cent of the braking pressure is delivered to the rear and 32 per cent to the front end. All brake drums are of approximately 14 in. inside diameter, and the width of the brake lining is approximately 2 in. An entirely separate emergency brake, comprising unequalized expanding shoes on the rear axle, is provided.

Has Planetary Step-up Gear

The pedal control is identical with that on the Straight Eight, having the same planetary step-up gear and stoplight switch on the left side of the gear box. Packard engineers state that the planetary gear produces a rapid travel of the end of the operating lever, which quickly takes all of the slack out of the entire operating system. Then, as the operating or master lever passes over the top center and approaches the centerline of the connecting rod, its effective arm is greatly shortened, producing the high pressure multiplification which is required for easy operation of four brakes. In this way, a light foot pressure results first in rapid travel, which brings all brakes into action, and then gives high pressures which make for rapid deceleration.

A short rod connects the planetary operating lever with an intermediate lever which is centered freely on the left front equalizer shaft. The front equalizer assembly is carried in bearings which are located on the intermediate frame cross member. From this intermediate lever another rod extends backward to one end of the bar which forms the equalizer between the front and rear systems. This bar is fulcrumed at the forward end of a short rod which connects with the center of the rear equalizer bar. The opposite end of the main equalizer bar is somewhat shorter and is connected to the front equalizer bar by a long rod which extends forward.

Actuated by Equalizer Bar

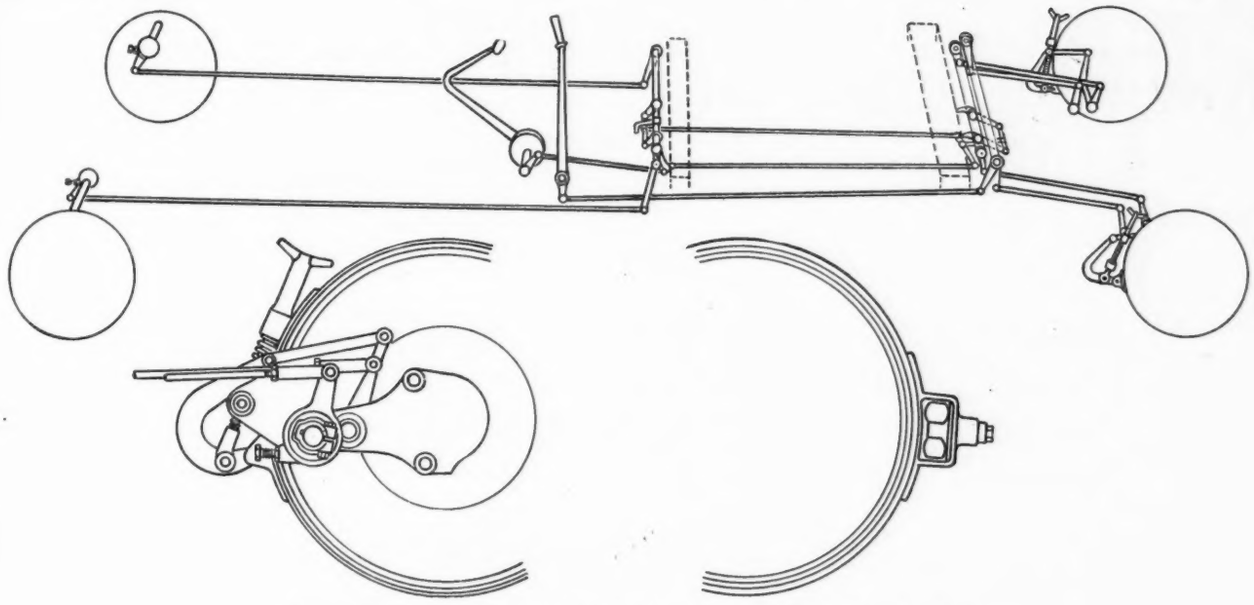
The front axle brake system is directly actuated by the equalizer bar just described. This bar is supported by forged hooks which are inserted in holes in the lower ends of the equalizer levers. These levers are mounted near the inner ends of two short equalizer shafts that have their bearings in brackets riveted to the center cross member. The center bracket is extended downward to carry an adjustable screw stop which contacts with the center of the forward equalizer bar. As the equalizer assembly is located at the left of the propeller shaft, the right equalizer shaft is somewhat the longer of the two.

At the outer ends of the equalizer shafts and just inside of the frame channels, longer levers are placed and are connected by long cables to the operating levers which are carried at the frame above the center line of the front axle. As the rear ends of these cables are located inside of the cross channels and the front ends are outside, ferrules guide the cables through the side channels at about the rear of the front tires.

Straight Eight practice has been followed in the construction of the front axle. The knuckle pin is inclined so that its projected centerline intersects the ground plane near the center of the tread and ball bearings are used to facilitate easy steering. A two-row annular bearing is fitted at the top and a single row bearing of the cup and cone type at the bottom.

No provision is made for release of the outer front wheel during a turn as Packard engineers insist that greater safety is insured when all brakes are operated under similar conditions. To insure greater strength and promote appearance all wheels are made somewhat heavier and have bolts passing through the inner ends of all the spokes. Wood wheels are continued on all models with the exception of the four-passenger sport, which has steel disk wheels.

In the rear the brakes are operated through the rear equalizer, which is similar to that in front. The short rod leading back from the main equalizer, as shown in the drawing, connects with the center of the rear



Diagrammatic layout of the Packard single six braking system

equalizer, which is hooked into the equalizer levers. The rear stop is different from that used at the front. Short projections extend upward and forward from the hubs of the equalizer levers and contact with the rear cross channel when the brakes are released. These stops, in conjunction with heavy springs connected to the free ends of the rear brake operating levers, eliminate rattle.

Short rods connect the operating levers at the outer ends of the rear equalizing shafts with levers located on the rear brake inclosures. Adjustment of the rear brakes is made by means of thumbscrews. The rear band brakes are fairly conventional in design and are anchored at the back to produce approximately a half wrap. Complete separation of the emergency braking system is assured, as a separate linkage connects the hand lever with a cross shaft which is located just back of the rear equalizing shafts. No equalizers are installed at this point and levers at the outer ends of the shaft are connected to the cam levers on the rear axle by short rods. Adjustment is made at the threaded rod ends. The internal construction of the rear expanding emergency brakes is approximately that of the front service brakes. In accordance with established Packard practice, the hand lever is located at the left of the driver's seat.

New Body Type Added

In addition to these features, several detail changes have been made, chiefly in body work, and one new body type has been added to the line. An interesting development is found in the pressed steel shields which shroud the universal joints, for the purpose of protecting the floor boards from flying grease.

The former two-passenger runabout has been replaced by a four-passenger runabout having practically the same body lines. A rumble seat is located under the rear deck of the new car, which thus accommodates two extra passengers. This seat is upholstered in leather over deep springs and the compartment is fully finished in carpet. When the cover forming the back of the rumble seat is raised, an automatic switch closes the circuit to a lamp, which provides continuous interior illumination. Another compartment in the forward upper portion of the rear deck provides accommodation for a golf bag or similar article. Access to the rear compartment is through two rectangular doors.

Adjustable regulators now control the rear windows of the sedan and sedan limousine, and Grolan gasoline gages are now mounted on the instrument boards of all models. The instrument board has been rearranged slightly and is now provided with a walnut finish in all models. The diameter of the steering wheel has also been increased throughout the entire line.

With the addition of four-wheel brakes, prices on all but one of the models have been raised $100. The runabout, which has been redesigned to accommodate four passengers, now sells at a price $300 higher. Prices for the complete line of the new series are as follows: Five-passenger touring, $2,585; 4-passenger sport model, $2,750; 4-passenger runabout, $2,785; 4-passenger coupe, $3,275; 5-passenger coupe, $3,450; 5-passenger sedan, $3,375; 5-passenger sedan-limousine, $3,425; 5-passenger permanent top touring, $2,850; 7-passenger touring, $2,785; 7-passenger sedan, $3,625; 7-passenger sedan-limousine, $3,675.

Blake Shock Absorber

THE accompanying illustration shows the Blake shock absorber, a recently marketed product of the Blake Automotive Equipment Corp. It is of the type in which friction between a strip of webbing and a metal drum retards the rebound of the chassis spring. Compression of the spring is not interfered with, the resulting slackness of the webbing being taken up by a spiral spring to which the end of the webbing is attached.

How Qualities of Coated Automotive Fabrics Are Determined

Part II

Personal element must be eliminated to secure reliable results in anchorage test. Exposing samples to elements simulates accelerated service. Tensile and tearing strength measured by use of standard machine. Weight of coating learned by use of solvents.

By Ernest B. Benger and N. M. Nickowitz

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ADHESION of a pyroxylin or rubber film to the fabric base is commonly spoken of as the anchorage of the material. This property is important and a satisfactory test for it is highly desirable. In the past the anchorage of a film to the fabric was judged by determining by hand how easily the film could be loosened and stripped from the fabric.

Strength of the film has an important influence on the anchorage of the film when tested by hand. Thus, with two pieces with equal anchorage, the one having the stronger film will appear to have the lower anchorage because the high tensile strength of the coating permits it to be torn free from the base more easily than in the other case, where the film breaks when pulled.

Results of hand tests for anchorage depend entirely on the judgment of the individual making the test and, therefore, introduce the undesirable personal equation just as in the case of the hand scrub test. It is very evident, consequently, that a test is desirable which will yield results which are consistent and can be expressed numerically.

IN this, the second and concluding part of an article dealing with coated fabrics, the authors outline additional tests which are necessary in determining certain qualities of this class of material. They give, also, some typical specifications for both rubber and pyroxylin coated textiles.

Comments by readers interested in discussing these articles will be welcomed.

After some preliminary experiments, suggested by the Bureau of Standards test of "frictioning" in rubber belting, etc., a procedure was developed and has now been adopted as standard for determining the anchorage of the film.

Application of the test to pyroxylin coated fabrics is as follows: By means of a spreader knife or spatula, a piece of cotton sheeting measuring approximately 10 x 13 in. is given two thin coats of a pyroxylin "jelly" (100 gm. 12 per cent pyroxylin solution in ethyl acetate to which 12 gm. castor oil have been added). The sheeting is dried at room temperature after each coat and if it is rough after the second coat of jelly has dried, it is run through calender rolls until smooth. A third coat of jelly is applied and an 8 x 11-in. piece of the material, whose anchorage is to be determined, immediately is placed coated side down on the wet surface. The two pieces are then pressed together firmly by means of a wooden roller, in order to insure uniform adhesion.

After making sure of good union between the two materials, the combined material is allowed to dry at room temperature for about two hours. Following this preliminary drying, the sample is dried further at 65 deg. (150 deg. Fahr.) for sixteen hours, at the end of which time, three pieces 2 x 8 in. are cut out in such a manner that the 8-in. dimension is parallel to the warp threads of the fabric base of the original material.

The two fabrics are separated at one end of the strip and pulled apart for a distance of about 2 in., being careful to have the film of the original material adhere to the coated sheeting. This can be done successfully if care is taken to start the separation in the proper manner. The 2-in. portions which have been pulled apart are narrowed down to a width of 1 in. so that they will fit the clamps of the Scott or other make of tensile strength testing machine.

They are then pulled apart in the Scott machine at a speed of 2 in. per minute. It is necessary that the fabrics separate cleanly when being pulled apart. If there is a tendency for the fabric to unravel at the side of the test piece, this must be corrected by cutting the threads, as the raveling causes an appreciable error in the final result. The results of the tests are reported as pounds necessary to strip a test piece 2 in. wide. This procedure has yielded very satisfactory and consistent results.

The anchorage of a rubber film is determined in essentially the same manner and the same precautions are necessary. The samples are, however, prepared in a slightly different manner.

A piece of drill is given two thin coats of rubber cement (40 per cent smoked sheet, 4 per cent rosin, 6 per cent shellac and 50 per cent benzol) and permitted to dry at room temperature for approximately five minutes. A third coat of the rubber cement is applied to the material whose anchorage is to be determined after the varnish has been partially removed by buffing. After this

sample is allowed to dry a short while the two pieces are pressed together evenly and firmly by means of a calender. The material is allowed to "rest" for three hours and the anchorage determined as in the case of the pyroxylin material.

Strength of Combining Test: In order to obtain accurate and reliable data on the strength of combining of double texture material, both before and after heat and weather aging, it has been found necessary to develop a method of testing under uniform conditions. The anchorage test, described above, required but little modification to give satisfactory results for strength of combining. The method of operation can be inferred readily from the description of the anchorage test.

Blooming Test: When rubber is vulcanized by means of sulphur, only a portion of the sulphur added combines with the rubber, the other portion being held in the rubber while it is vulcanizing, and after a time it may crystallize out and the rubber is then said to have "bloomed" or "sulphured up." The manufacturer usually is familiar with the amount of free sulphur the compound will hold without blooming and tests the coating for free sulphur periodically. The purchaser's most practical way of checking this is merely to store a sample in a cool, dark place and observe it periodically for this defect.

Weather Exposure Test: Exposure tests, in general, can be considered as accelerated service tests, since the results obtained give, in a comparatively short time, an indication of the general wearing qualities of the coated material. The test has been found to be of greatest value in testing automobile top materials.

The time of the exposure is usually one year, because it is desirable to have the material subjected to the weather conditions of the four seasons. A one-year exposure is considered equal to about three years of actual service.

How Exposure Tests Are Made

A frame 4 ft. 6 in. by 5 ft., having three equidistant cross-members, is made from 3 by 1-in. stock and supported by suitable uprights at an angle of 45 deg., facing south. The sample of material to be tested must be of sufficient size to cover the top of this frame and leave at least three yards for a "retained sample." The following observations and tests are made on the original material:

Appearance	Smoothness
Lustre	Pliability
Color	Scrub
Cold crack	Strength of combining cement
Tensile strength	Hydrostatic

Fold test giving the material 300 folds and after noting appearance, making hydrostatic test on the folded portion.

The material to be tested is placed on the frame and tightly drawn over the edges before fastening, so that a pocket will not be formed to collect and hold water during a rain. At the end of each three months' exposure, a strip is cut from the material on the frame and the above-mentioned tests and observation made on both the exposed sample and a portion of the "retained sample." At the end of a year of exposure, all the results are tabulated and conclusions drawn from the data obtained.

It is important that the location of the frames should be such that rigorous conditions are encountered by the material being tested. It has been observed that exposure in a manufacturing city causes much more deterioration than is produced in clean country air.

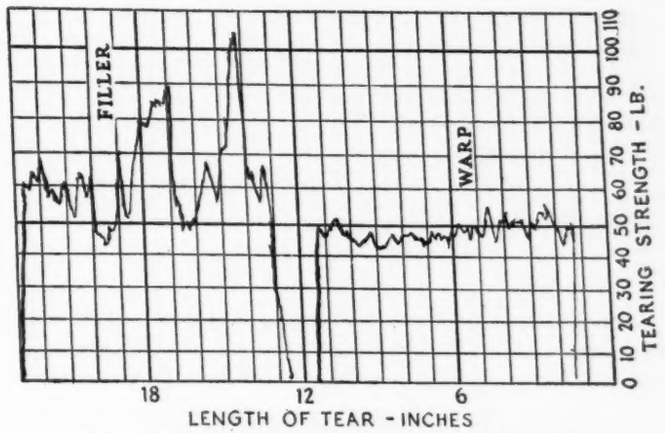


Fig. 1—Chart from tearing test of fabric. The area inclosed by the graph is divided by the length to obtain the tearing strength

Owing to the varying conditions met at different periods of the season, exposure tests on rubber or pyroxylin goods always are conducted so as to obtain comparable results. When a manufacturer desires to determine the aging quality of a competitive material, he usually exposes it along with a sample of his nearest comparable quality. Similarly, when he makes a change in compound, his standard is exposed along with the new sample, so that comparable data are always available.

Edge-Cracking Test: Edge-cracking tests are applied only to rubber coated fabrics. This test simulates the effect of turned edges, one of the first places where a top shows wear. This test is carried out by cutting a sample of the material 13 by 2¾ in., with length parallel to the warp. The material is then suspended with coated side out over a sharp edge in the form of a loop in which is placed a 2½-lb. weight. This sharp edge should be made of metal, preferably brass, and the goods should form an angle of 60 deg.

This test is comparative only and its duration is dependent on weather conditions as well as on the quality of material tested. The test is carried on until definite results are obtained.

This is a very important test on automobile top fabrics, because it combines the deterioration, due to weather exposure, creasing, and tension.

Tensile Strength Test: The tensile strength of coated or uncoated fabrics is determined by machines which are specially designed for this purpose and are readily available. The method for carrying out the tensile strength test has been well standardized, and has been published in so many places that it is unnecessary to repeat the directions here.

The information given by this test is of great importance in all cases where the material is to be subjected to much strain, as in upholstery, automobile tops, etc.

Tearing Strength Test: Tearing strength is determined by the same machine which is used for tensile strength tests. In this case a tear is started in the fabric in the direction in which it is desired to measure the strength. The goods at one side of the tear are connected with the upper jaw of the machine and the goods on the opposite side with the lower jaw. In this case a graph of the stress put on the goods is taken. Since the result is very irregular, as illustrated in Fig. 1, it is common practice to repeat the test several times. In order to further average the results it is best to use a planimeter to measure the area between the axis and the irregular line, thus obtaining a measure of the work

done in tearing the fabric. The area is then divided by the length of the tear, giving the result in terms of average force required to tear. The tearing strength is, of course, taken in both directions, with the warp and with the filler.

Analysis of Coating and Fabric: The procedure followed in routine analysis of pyroxylin coated material consists in first stamping out a sample with a die 4 by 3.81 in. The area of this test piece is such that its weight in grams when multiplied by three is equivalent to the weight of the material in oz. per sq. yd. The film is dissolved off with ethyl acetate, the fabric dried and weighed, the difference being the weight of coating. Weight of the coating is expressed in ounces per running yard and the fabric in yards per pound. If the fabric is sized, sizing is removed with diastase. Count and construction of fabric are determined in the usual manner.

Rubber coated fabrics are analyzed in essentially the same manner, except that the coating is removed with benzol or gasoline.

In the case of double texture fabrics, the weighed sample, after the coating is removed, is treated with "Paraffin White Spirit" (130-220 deg. C. distillate from motor gasoline), and the fabrics are separated. The cement is freed from the fabrics by scraping them with a spatula and extracting with more solvent.

Reasonable variations in weight are to be expected and limits of plus or minus 5 per cent generally are considered permissible.

Fabric Analysis tests are of great importance, because two pieces of goods may be quite similar as to total weight and general appearance, but one may have been manufactured by putting a light coating on a heavy drill and the other by application of a moderate coating on a sateen. The ratio of weight of coating to weight of a given type of fabric must be within fairly definite limits to give a well balanced and satisfactory piece of leather substitute.

Coated Fabric Specifications

In accompanying tables are given what can be considered fairly typical specifications for a few types of fabrics which are in common use in the automotive industries. The reader is cautioned, however, against taking any of these figures as representing exactly what can be considered the best materials for the purposes indicated. We have chosen to make the figures definite rather than to show the possible range of variation in each of the qualities specified, but this does not mean at all that materials which possess different specifications would be unsatisfactory for the purposes mentioned. This list of numbers will serve, however, as a guide to anyone interested in drawing up specifications for his own use and assist him in comparing goods from different manufacturers as to their detailed construction and qualities.

While the tests which have been described clearly indicate the value of any leather substitute, it is not necessary to employ all of the tests in the case of any fabric for a particular purpose. The purchaser need specify and apply only those tests which indicate the qualities necessary for leather substitutes for his particular uses. Some of the tests are such that they can be written into specifications; others are of greater use to the purchaser in deciding what makes or types of leather substitute are best for this purpose; that is, they are broader tests than are required for specifications.

There is reason to believe that more careful examination of materials of the type under discussion will insure the purchaser of securing material closely adapted to his needs and will enable the manufacturer to interpret the requirements of his customer more accurately. It seems likely that there will be greater satisfaction on the part of all parties concerned if a definite appreciation of the characteristics of leather substitutes are known. The series of tests described above will contribute a great deal toward this understanding.

Typical Specifications for Good Grade Rubber Top Material

	Double Texture	
Total weight	38 oz./54 in. yd.	38 oz./54 in. yd.
Weight of fabric (face)	4.4 oz./54 in. yd.	4.4 oz./54 in. yd.
Weight of fabric (back)	8.2 oz./54 in. yd.	9.6 oz./54 in. yd.
Weight of coating	17.4 oz./54 in. yd.	16.0 oz./54 in. yd.
Weight of cement	8.0 oz./54 in. yd.	8.0 oz./54 in. yd.
Type of fabric (face)	3.60* sheeting	3.60* sheeting
Type of fabric (back)	1.85*—3 lf. drill	1.60* drill or whipcord
Count of (face)	56/56	56/56
Count of (back)	64/38	64/44 drill 65/60 whipcord
Scrub (minimum)	50	50
Anchorage	5 lb.	5 lb.
Hydrostatic	10 ft.	10 ft.
Tensile strength	95/45	100/50
Combining strength	4 lb.	4 lb.

* Number of yards per pound.

	Single Texture	
Total weight	38 oz./54 in. yd.	36 oz./54 in. yd.
Weight of fabric	16.0 oz./54 in. yd.	9.6 oz./54 in. yd.
Weight of coating	20.5 oz./54 in. yd.	24.9 oz./54 in. yd.
Weight of cement	1.5 oz./54 in. yd.	1.5 oz./54 in. yd.
Type of fabric	0.96 Drill 4 Leaf	1.60 Drill 4 Leaf
Count of fabric	76/42	64/44
Scrub (minimum)	50	50
Anchorage	3.5 lb.	3.5 lb.
Hydrostatic	10 ft.	10 ft.
Tensile strength	85/40	80/40

Typical Specifications for Pyroxylin Coated Material

Test	High Grade Non-collapsible Top	High Grade Upholstery	Low Grade Upholstery	Interior Panels Open Bodies
Scrub	——	25	20	5
Deterioration in 4-week artificial aging	75 per cent	75 per cent	75 per cent	90 per cent
Tensile strength of coated fabric, lb. per in. width	Warp 85 Filler 80	Warp 85 Filler 80	Warp 90 Filler 70	Warp 85 Filler 50
Fold test	——	O.K. at 400	O.K. at 400	——
Hydrostatic	10 ft.	——	——	——
Cold test	——	O.K. at 20° F.	O.K. at 20° F.	——
Anchorage	6 lb.	6 lb.	5 lb.	4 lb.
Dry weight of coating per running yard	13 oz.	13 oz.	9.0 oz.	5.0 oz.
Fabric	Moleskin	Moleskin	Sateen	Sateen
Count, threads per inch	Warp 58 Filler 120	Warp 58 Filler 120	Warp 93 Filler 60	Warp 93 Filler 60
Weight of grey fabric per running yard	16 oz.	16 oz.	14 oz.	12 oz.
Construction of fabric	——	——	4 x 1	4 x 1

Fellows Announces a Full-Automatic Gear Grinder

Feature of new machine is "rolling head," motion of which is controlled by a master involute tooth. This unit is of light weight, being made from an aluminum alloy casting. Diameter of grinding wheel small. Instrument to check results supplied.

A FULL-AUTOMATIC involute gear grinder, possessing some unusual features in design and operation, has been placed on the market by The Fellows Gear Shaper Co. This company, which has been grinding involute curves for the past 22 years, has developed several types of involute grinder, and the machine illustrated is the result of this extensive experience.

This grinder is entirely automatic in operation, and after it has been set up it is only necessary for the operator to locate and clamp the gear on the work-spindle and then pull a lever. The machine then automatically takes care of the rolling action of the gear against the flat surface of the grinding wheel, indexes for each tooth, trues the flat face of the grinding wheel, and stops when the gear has been completed whether it requires one, two or more cuts, provision being made in the design of the machine for taking care of this automatically. All of the operating levers are located at the front of the machine, and the base is made square, so that the machines can be set end to end to economize in floor space. The entire gear box and auxiliary working members are automatically lubricated.

Reduced to its simplest elements, this machine, as the illustrations show, comprises a base carrying a grinding wheel head which is adjustable for different gear diameters, and a slide carrying a member known as the "rolling head," the rolling action of which is controlled by a master involute tooth.

The heart of the machine is in what is termed the "rolling head." This is of light weight, being made from a heat-treated aluminum alloy casting, and perfectly balanced. It oscillates on ball-bearing supported trunnions mounted on the slide, the latter being moved backward and forward by a reduction-driven barrel cam. This rolling head contains the index mechanism and index plate, and is so designed that the indexing of the work can be accomplished without shock in one-tenth of a second.

Master Tooth Ground in Special Machine

On the outer end of the rolling head is the master involute tooth. This is a long involute gear tooth which contacts with an adjustable abutment in the form of a long, straight-sided rack tooth. The master involute tooth, which is ground on a special machine, can be made accurate to within 0.0001 in. Both this involute tooth and its abutment, or master rack, are made from alloy steel, selected for good wearing qualities, and are hardened and ground. The rolling contact of the master involute tooth with that of its abutment resembles the action of a gear tooth rolling on a rack.

The most interesting part of this mechanism is the fine adjustment for this abutment, which controls the pressure angle of the involute tooth which is being ground. By this means it is possible to control the accuracy of the finished product and to bring it within very close tolerances of the reference gage that has been adopted as a

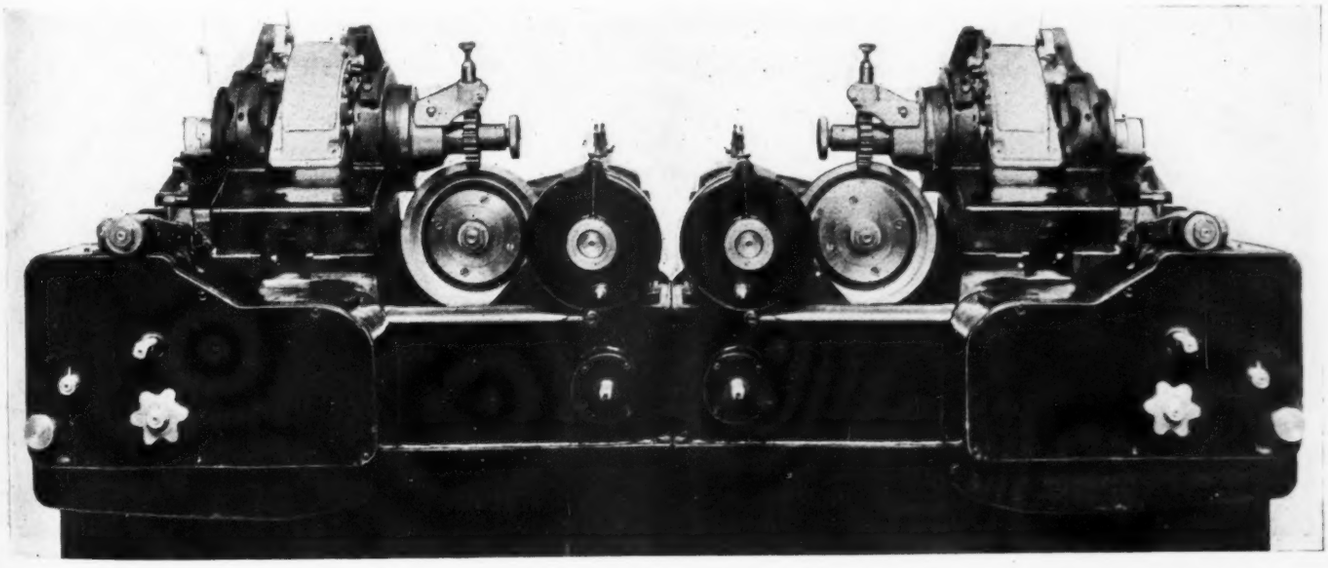


Fig. 1—Front view of full-automatic gear grinder, showing right and left hand machines, with all guards removed

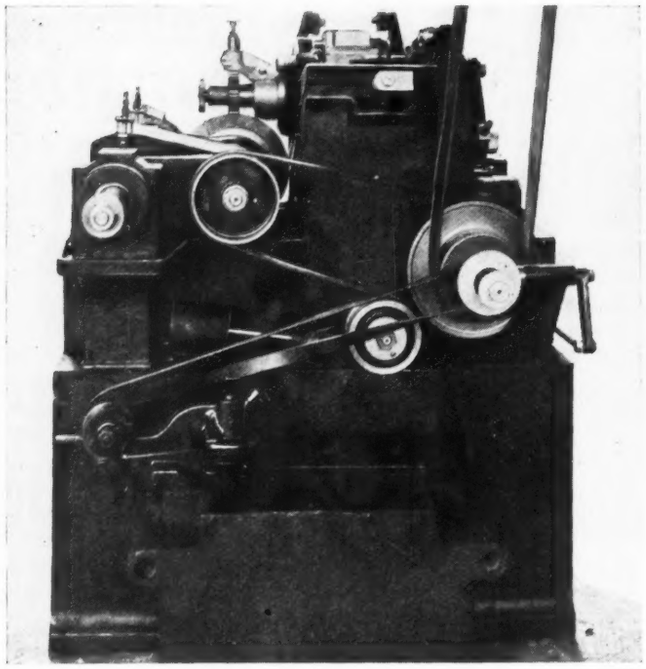


Fig. 2—Left—Rear view of full automatic gear grinder showing main drive, for operating mechanism, wheel and cutting compound pump
Fig. 3—Above—Close view of master involute tooth, its mating abutment and adjustment for pressure angle control

standard. This adjustment, in addition to providing for any wear that does take place, furnishes a means of keeping the work under absolute control.

Another important point in connection with the grinding of involutes is that of retaining a constant pressure of the work against the grinding wheel. If this pressure varies it is impossible to grind a perfect involute, because with a varying pressure the rolling action of the work against the wheel will not be positive and, consequently, an inaccurately-shaped gear tooth will be the result.

It has been previously mentioned that the rolling head is made from an aluminum alloy casting of light weight, balanced and mounted on ball-bearing supported trunnions, so that a comparatively slight force is required to move it; any force that is applied is not expended in overcoming friction but exerts a positive and known pressure. The force is derived from a weight attached to the free end of a wire cable fastened to the rolling head and passing over an idler. Removable segments are provided so that the desired pressure of the master involute tooth against its abutment can be maintained; and with no flexible mechanism between the master involute and its controlling abutment the control of the work against the grinding wheel is positive.

A notable feature on this machine is the small diameter of the grinding wheel used. The reason given for this is that the size of the wheel determines the size of the machine and the speed at which it can be operated. A large wheel necessitates the use of a long work arbor, which makes it difficult to support the work rigidly. The work-spindle must be relatively larger and longer, and the entire operating mechanism must be heavy and massive. Another important desideratum is the reduction of vibration, which latter is very destructive to wheel life and effici-

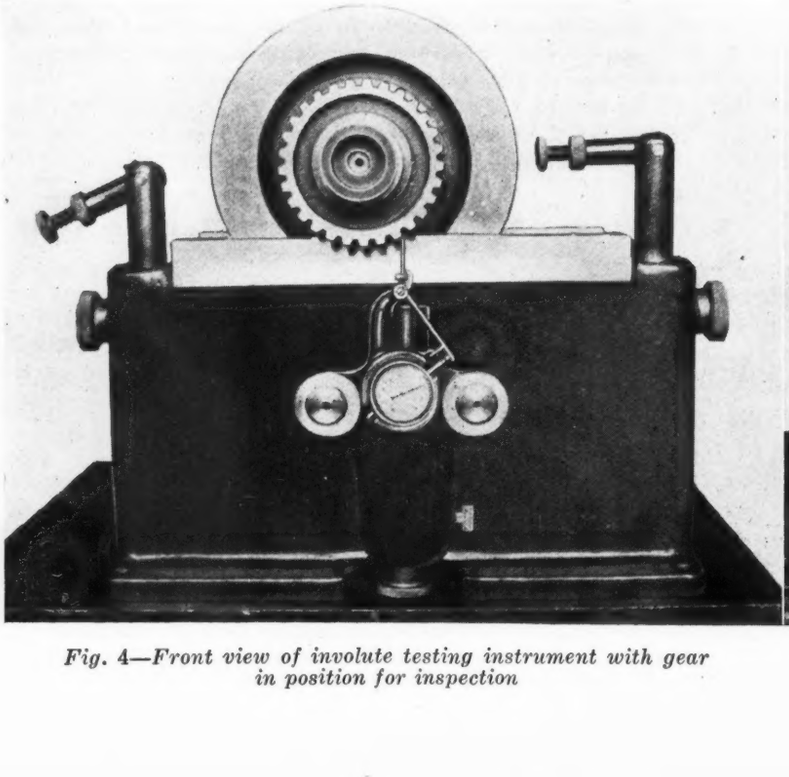


Fig. 4—Front view of involute testing instrument with gear in position for inspection

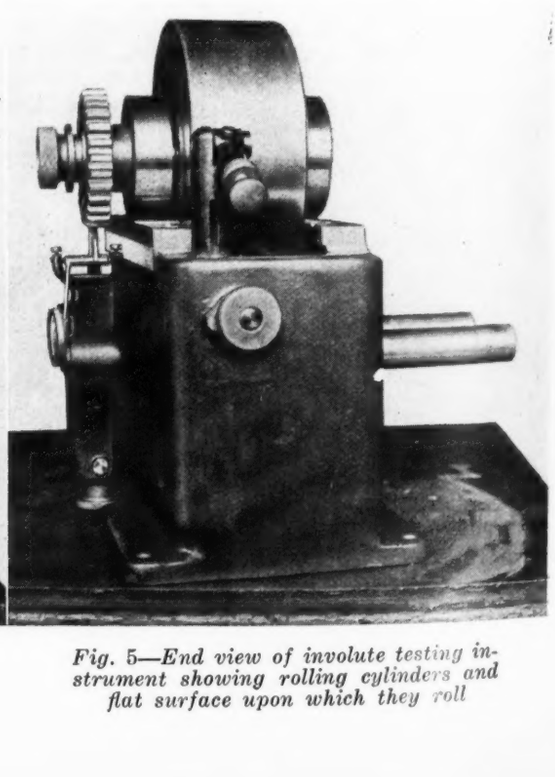


Fig. 5—End view of involute testing instrument showing rolling cylinders and flat surface upon which they roll

ency. With long overhanging parts, greater difficulty is experienced in getting sufficient rigidity than is the case if the machine is more compactly designed. It is also claimed that more nearly uniform density can be secured in a 10 in. wheel than in a larger one.

Wheel truing also is facilitated by the use of a moderate sized wheel, and the truing operation is automatic, only a light cut being taken. The necessary amount of truing having once been determined, the machine automatically duplicates this. The wheel can be trued off after the gear has made one or more revolutions as may be found desirable.

It has long been recognized that for the production of accurate concentric work the most vital bearing should be selected as a location point and the work located from this same surface for all operations. It is claimed that in gear grinding this practice can be followed most effectively by making right- and left-hand machines for grinding the two sides of the teeth. This applies particularly to the grinding of gears integral with a shaft, but it is also good practice to follow when grinding all forms of gears.

Removable Rolling Heads Used

Another interesting feature incorporated in the construction of this machine to assure the production of concentric gears is the use of removable rolling heads. It is asserted that if arbors, index plates, master forms, etc., must be changed for grinding different sizes of gears, errors are sure to creep in, and the result is eccentric work. By having the rolling heads interchangeable, none of the vital members are affected in changing over from one gear to another. All that is necessary is to remove the caps from the trunnions when the entire rolling head and its auxiliary mechanism can be easily lifted out and replaced by another complete head.

It is well known that spacing errors in gears will cause non-uniform motion with its attendant vibrations and noise, but it is not so well recognized that inaccuracies in involute curve and pressure angle have the same effect. The more accurately the gear is cut, the smaller the amount of metal to be removed by grinding and the quicker the gear can be ground.

Measuring Instrument Furnished

In grinding gears, a standard for angularity of involute is necessary, and before any progress can be made, standards of accuracy must be established and reference gages made for each size of gear that is to be ground. A ground gear may be perfect so far as tooth spacing and true involute form are concerned, but if it is not conjugate to the same rack as a gear ground a week earlier on another machine, then it will not be satisfactory. The fact that these difference in pressure angle may be very slight makes the problem all the more difficult. Involute curves must be kept within 0.0002 in. of an established standard to be satisfactory.

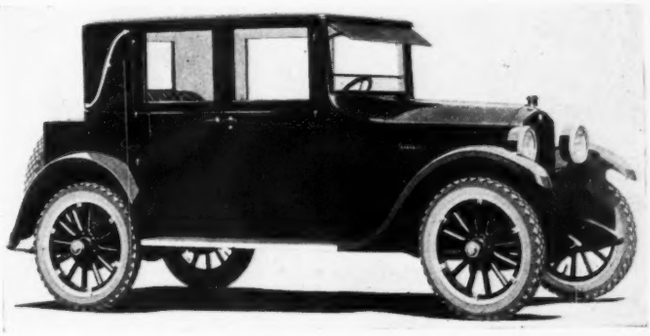
Some means of checking or comparing the gears ground with the established standard is essential if satisfactory work is to be obtained, and an involute measuring instrument is used for this purpose. As the illustrations show, this consists of two cylinders representing the base circle of the gear to be measured. Concentric with it, and held on an arbor, is the gear to be inspected. These cylinders are rolled on hardened and ground steel surfaces, and exactly in the same plane as these surfaces is a jewel contact point that bears against the involute surface of the tooth to be measured.

As the cylinders are rolled along the plane surfaces, with the contact point bearing on the tooth, no movement of the indicator needle is visible if the curve is a perfect one. Any variations from the theoretically correct involute are indicated in ten-thousandths of an inch by the dial indicator actuated through a multiplying lever.

Lower Priced Sedan Added to Hupp Line

IN addition to the seven body types which were announced at the time of the revision of the chassis and powerplant, the Hupp Motor Car Corporation is now bringing out an eighth body model, designated the club sedan. Five passengers are accommodated, two in front and three on a full width rear seat. The body has three doors and is priced at $1,425. Interior arrangement is such as to utilize the space under the rear of the front seat for footroom for passengers in the rear seat. This results in a rather short body and permits carrying an unusually large trunk and a tire carrier at the rear with no overhang beyond the spring horns.

The front seat board is six in. above the floor boards and overhangs the seat pedestal 8 in. at the rear. Inside dimensions of the trunk are approximately as follows: length, 42½ in.; width, 12 in., and average height, 15 in. As the trunk extends almost across the full width of the body, golf clubs and other long articles can be accommodated.



New Hupmobile sedan

Doors are placed at both sides of the front compartment and at the curb or right side of the rear compartment. With the exception of the window in the rear panel, all windows are provided with regulators. The interior of the body is upholstered in the same materials that are used in the standard sedan. Equipment includes a dome light, rear vision mirror, visor and windshield wiper.

Hood, radiator shell and fenders are black baked enamel and the body is finished in blue paint up to the belt line. The upper rear quarters are covered with black leather fabric and carry diagonal aluminum bows. Leather fabric is used for the exterior covering of the soft top.

Character of Steel Affects Carburizing

SAMPLES of various "normal" and "abnormal" steels submitted to the Bureau of Standards by different manufacturers have been carburized and examined miscroscopically. The structural characteristics of these carburized steels confirm the contention that there is a difference in the "carburizing properties" of steels which show but little difference in their composition as ordinarily determined. These differences consist in variations in the average depth of penetration, as well as in the character of the pearlite. The real significance of the differences, so far as commercial practice is concerned, is still a matter of surmise.

Saurer 6½-Ton Truck Has Bevel Gear Single Reduction Drive

Special type of engine brake is another of features included in new model, which is excellent example of high-grade design. Cooling and lubrication systems are of particular interest. Rear axle is of the full floating type, with hollow drive shafts.

By P. M. Heldt

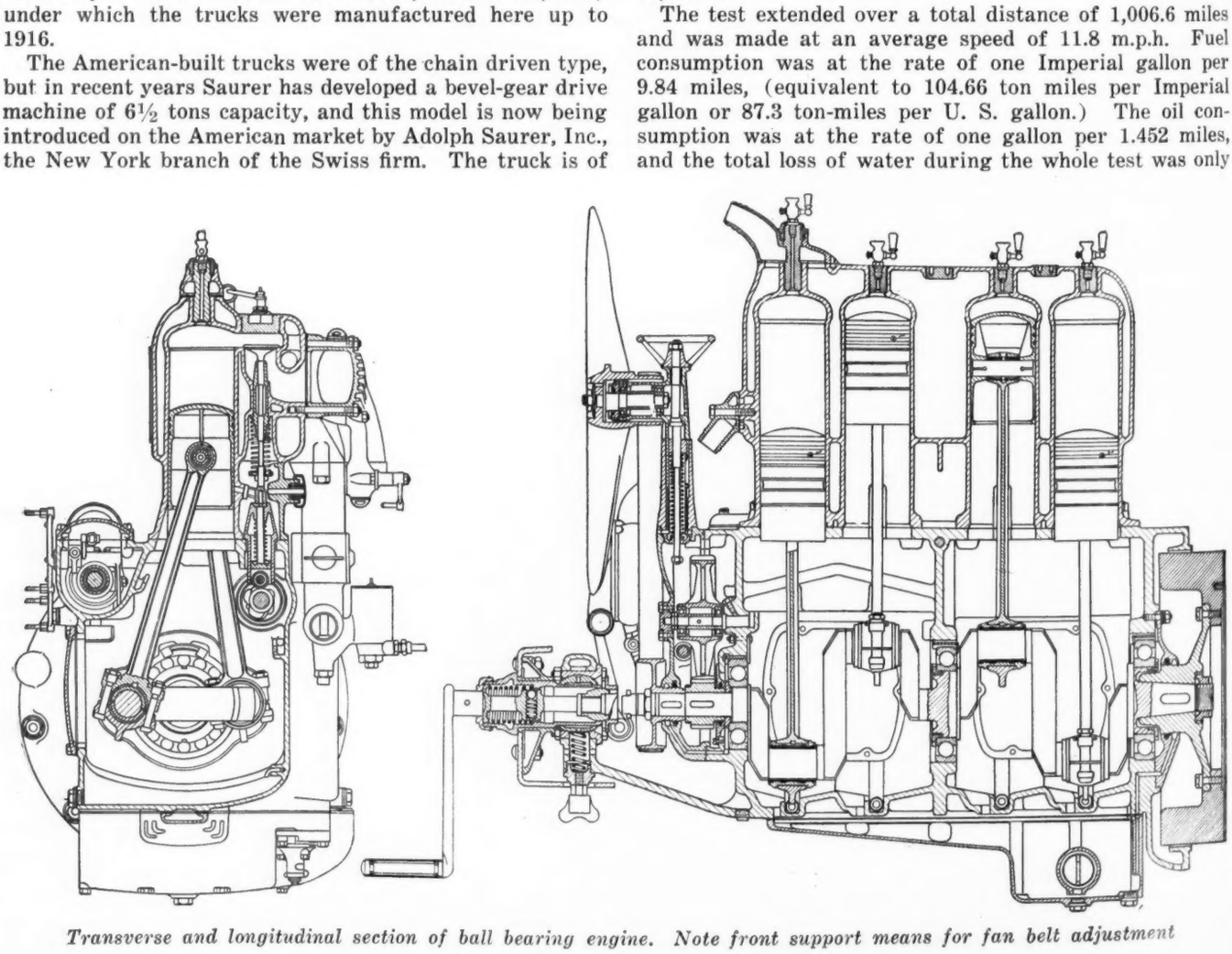
THE firm of Adolph Saurer has been producing commercial vehicles continuously since 1896, and therefore is one of the oldest motor vehicle manufacturers in the world—probably the oldest specializing on commercial vehicles. While the Saurer truck originated in Switzerland and is still being manufactured there, the company controlling it also operates a factory in France, and maintains sales branches in England, Spain and the United States.

The first Saurer trucks were imported into this country as far back as 1903. Later a license agreement was entered into with the Saurer Motor Co. of Plainfield, N. J., controlled by the International Motor Co. (Mack Truck, Inc.) under which the trucks were manufactured here up to 1916.

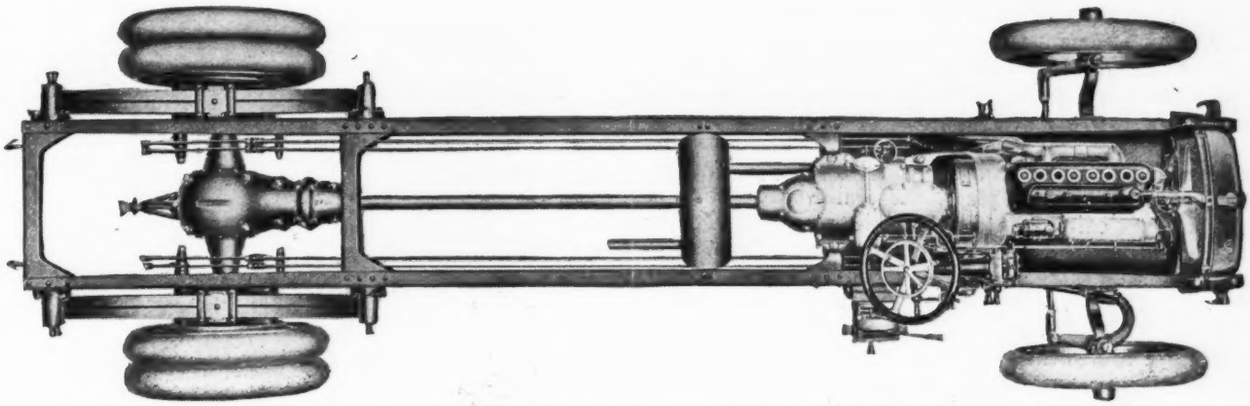
The American-built trucks were of the chain driven type, but in recent years Saurer has developed a bevel-gear drive machine of 6½ tons capacity, and this model is now being introduced on the American market by Adolph Saurer, Inc., the New York branch of the Swiss firm. The truck is of very interesting design. It incorporates many original features among which is its engine brake, and bears evidence of high-grade construction throughout.

A truck of this type was recently subjected to official tests by the Royal Automobile Club of Great Britain, the tests bearing on the fuel, oil and water consumption, general reliability and the action of the motor brake with which the truck is fitted. The total weight of the empty truck with body was 9856 lb., of which weight 4340 lb. was carried on the front and 5516 lb. on the rear wheels, and the average load carried during the tests was 13,956 lb., making the total average weight of truck and load 23,812 lb.

The test extended over a total distance of 1,006.6 miles and was made at an average speed of 11.8 m.p.h. Fuel consumption was at the rate of one Imperial gallon per 9.84 miles, (equivalent to 104.66 ton miles per Imperial gallon or 87.3 ton-miles per U. S. gallon.) The oil consumption was at the rate of one gallon per 1.452 miles, and the total loss of water during the whole test was only



Transverse and longitudinal section of ball bearing engine. Note front support means for fan belt adjustment



Plan view of Saurer 6½-ton truck chassis with single reduction bevel gear drive

one pint. No other work than replenishment, lubrication and greasing was done throughout the trial, and there were no involuntary stops of any kind. Whenever it was necessary to use the brakes, the engine brake was used, either alone or in combination with the hand or foot brakes.

The most outstanding feature of the truck is its engine brake, by the use of which the engine can be made to develop substantially the same retarding torque as its maximum driving torque when in regular operation. This feature makes the truck particularly suitable for use in mountainous districts, and it is no doubt at least partly because of the additional safety afforded by the engine brake that the Saurer chassis is used exclusively in the Alpine passenger services operated by the Swiss Federal Government.

The engine is of the four-cylinder type, with a bore of 110 mm, and a stroke of 180 mm. (4.33 x 7.09 in.) and is rated at 40 hp. at 1000 r.p.m., to which speed the governor is set. The cylinders are cast in one block, with the cylinder head integral. The inlet manifold is cast in the block and the carburetor bolts up directly against the engine, while the exhaust manifold is separate and is formed with cooling flanges on the outer side.

Engine Is L-head Type

The cylinders are of the L-head type, the valves being operated from a single camshaft in the crankcase by pushrods in the usual manner, the chamber containing the pushrods and valve springs being closed by two cover plates. All cylinders, as well as the valve pockets, are completely surrounded by water. The water enters the jacket at the forward end and is conducted by internal passages around the valve chambers to the rear of the block, whence it returns through the jacket surrounding the cylinders proper to the front, where the inlet to the radiator is located.

Tungsten steel valves are used, operating in cast iron guides pressed into the valve chamber wall from below. It is characteristic of the provisions for minimizing wear which have been made throughout the design that the valve stems are undercut and the guides recessed to form an oil chamber around the stem. Cam followers of the roller type are used and are held in contact with the cams by two light springs. Adjustment for clearance can be made by means of cap nuts with lock nut at the top of the pushrods.

Pushrod guides of cast iron are cast in two sets of four, the front and rear one of each set registering into the crankcase. Bearings for the pushrod are provided at the top and bottom of the guides, the top ends of the latter being shaped to serve as oil pockets which catch oil passing through short inclined tubes set into the cylinder wall, into which oil is forced by the scraping action of the bottom edge of the piston. Between the second and third pushrods there is a spring plunger which serves the purpose of a camshaft torque evener; it is under heavy spring pressure, and the hardened roller at its lower end presses against a cam of square shape, so set relative to the inlet and exhaust cams as to obviate the tendency of the camshaft to snatch ahead when any cam follower is on the trailing slope of the cam lobe.

Pistons Are Unusually Long

The pistons are of cast iron, with domed head and with ribs between the pin bosses and the sides only. There are three lap-jointed rings, all above the pin, and these are prevented from rotating in their grooves by set screws. A feature worthy of note is the great length of the piston, equal to more than one and a half times the bore.

A rather novel scheme is employed for fastening the piston pin in the piston bosses. The ends of the pin are split, and a taper-headed bolt is inserted from one end, which takes a spool-shaped nut that draws with it a hollow, tapered plug into the other tapered-out end of the pin. There is a spring washer behind the internal flange on the conical plug, to lock the nut against unscrewing, and a threaded collar on the inner end of the nut, to hold the taper plug and the nut together when the latter is unscrewed from the bolt.

Conventional practice is adhered to in the design of the connecting rod, except that it is of unusual length (2.4 times the length of stroke) and that the steel cap is secured to the rod in a somewhat unusual manner. The cap is recessed into the connecting rod head and is held to it by two bolts inserted through the caps and taking recessed shoulder nuts on top of the connecting rod heads. All reciprocating parts are made as light as possible and are equalized by weighing. The connecting rod caps are provided with splashers for throwing oil against the side walls of the crankcase, lubrication of the crankpin bearings being assured by means of oil holes on top of the bearings.

The crankshaft is of the three-bearing type and is supported wholly in ball bearings. The crankshaft axis is offset 1 in. from the center of the cylinder axes, and this offset, together with the comparatively long stroke, necessitates the provision of side channels at the lower end of the cylinders into which the connecting rods swing at the moment of greatest angularity. The outer races of the ball bearings are mounted directly in the aluminum of the crankcase and are held from rotation and endwise motion by means of plate springs with inwardly projecting lugs inserted into recesses at the top of the bearings. The center bearing is of a bore large enough to permit it being stripped over the crank arms, and its inner race is held in position on an enlarged portion of the crank journal by means of a threaded collar. The bearing at the fly-

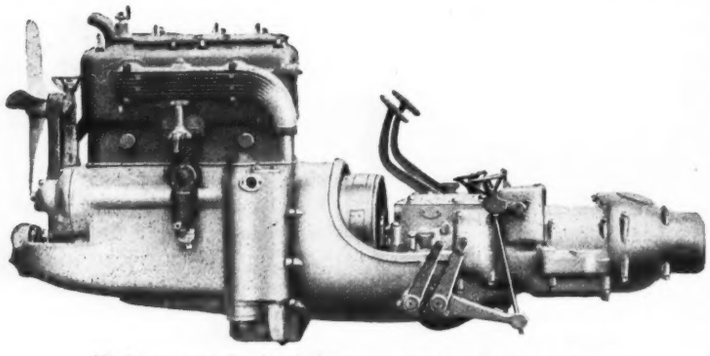
wheel end is similarly mounted and locked, while the front bearing, being of smaller bore, is mounted directly on the shaft and clamped in position by parts mounted in front of it and a set screw in the end of the shaft. Felt washers and oil return grooves are provided at both ends of the crankcase.

The aluminum crankcase is of the barrel type and is therefore cast in a single piece, the crankshaft with its bearings in place being inserted from the rear end. There are two large hand holes in the right hand side of the case, through which the pistons and connecting rods can be removed. The cover for the timing gear case is also of aluminum and is recessed into the wall of the case. Splash troughs are formed in the bottom of the crankcase and overflow holes are located adjacent to these troughs, through which all oil that drains down the sides of the crankcase may return to the oil well.

The use of ball bearings is not limited to the crankshaft, bearings of this type being used also on the camshaft (except at the middle) and on the intermediary gear. The so-called front end gears are cut with helical teeth, the pinion on the crankshaft meshing with an intermediary gear which is supported through two ball bearings on a stationary shaft carried in the forward end of the crankcase and in the cover plate of the camshaft gear housing. The intermediary wheel, of cast iron, turns at one-third crankshaft speed and meshes with the cast iron camshaft gear and the steel magneto drive gear, which latter turns at crankshaft speed.

A rather interesting feature is embodied in the lubrication, whereby the supply in the oil well is constantly replenished with fresh oil at a slow rate, a principle that seems to have gained a certain footing among makers of high-class cars in Europe.

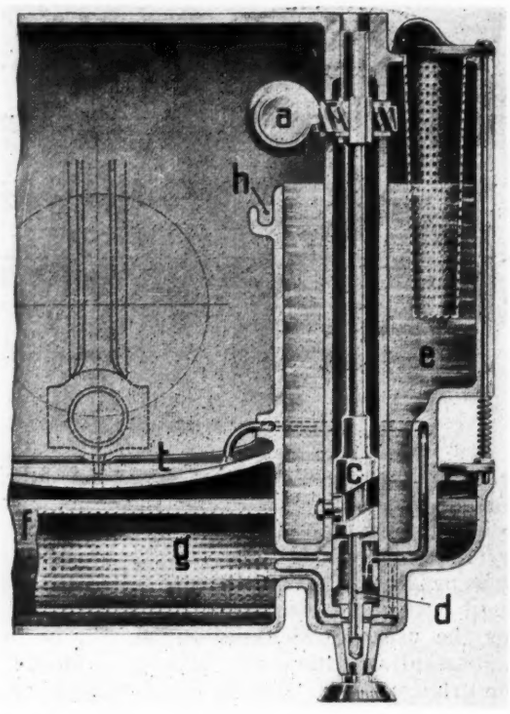
The oil pump is quite unusual in that it acts like a plunger pump, yet the motion imparted to it by the driving gear is of a rotary character. It really comprises two pumps in one, there being two plungers of different diameters, arranged end to end. The larger plunger serves to circulate the oil already in the system, while the smaller plunger beneath it constantly adds fresh oil to the circulating supply from a reserve tank cast in the side of the



Unit powerplant of Saurer truck, showing clean design

crankcase and in which the pump is located. Only the reciprocating motion of the plunger serves to move the oil, while the rotary motion brings parts cut in the plungers into registry with parts in the barrels at the proper time and thus obviates the need for valves.

Referring to the sectional view of the pump and its surrounding parts, the pump is driven from the camshaft through helical gearing, which imparts a rotary motion to the plunger stem. The larger plunger has an inclined slot cut in it, into which extends a roller whose stud is secured into the wall of the pump barrel. The result of this is that the rotary motion imparted to the plunger by



Section through oil pump and oil reservoir, also showing the oil pump drive

the helical gear is accompanied by a reciprocating motion, the driven gear being loosely mounted on splines on the plunger stem so as to allow of this reciprocation.

All new oil is poured into the reservoir surrounding the pump, and the rate of feed of new oil to the circulating supply can be varied by means of an adjusting screw at the bottom of the pump housing. There is an oil strainer in the filling hole and another in the oil well from which oil is drawn by the circulating pump. The oil filler is closed by a swivel cap, and a rod extends from this cap to a smaller one lower down which closes an opening on the level to which the oil well is to be filled with oil. Thus, when the oil filler hole is opened the overflow is opened at the same time and when oil begins to flow from the lower opening the operator knows that there is enough oil in the crankcase. A spear type level gage is provided in the fresh oil reservoir.

The governor is located in a housing at the side of the crankcase and cast integral with same. In addition to the centrifugal governor the spark-timing mechanism is located in this housing, which is provided with a sealed cover plate. Forward of the governor housing is located the water circulating pump and to the rear of it the magneto, the same drive being used for all of these parts.

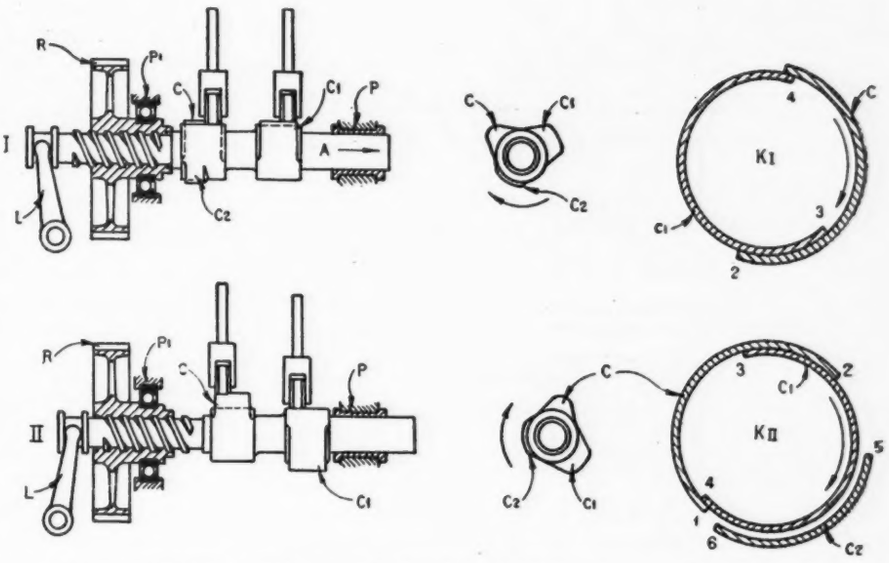
An advantage claimed for this arrangement is that the fluctuating torque of the magneto is combined with the constant torque of the pump, hence there is no tendency for the clearance between the teeth of the driving gears being taken up periodically and the gears therefore operating noisily.

The governor shaft is carried in two ball bearings, one located directly to the rear of the helical gear meshing with the intermediary gear, the other just forward of the magneto. The pump drive is taken through a square knuckle joint, the end thrust being taken up on hardened steel buttons. The pump shaft is hollow, and its single bearing, at the rear end, which is provided with a stuffing box, is lubricated by grease from a compression grease cup on the housing at the front.

In a truck developed in a mountainous country and in-

tended for service in such country, it is not surprising that special attention has been given to the cooling system. A quite large four-bladed cast aluminum fan is fitted, and is driven by a substantial flat belt from the forward end of the crankshaft. An extension of the fan hub forms the driven pulley. Into this pulley extends a stationary hub from the fan bracket mounted on the timing gear case. A spindle is bolted into the hub of the fan and is mounted in two ball bearings in the stationary hub.

Automatic tensioning of the fan belt is provided for by a coiled spring inserted between a sliding part of the fan bracket and the stationary part, but the belt tension can also be readily adjusted by hand, by means of the hand wheel on top of the fan bracket. The automatic tensioning takes account of variations in belt length due to changes in the humidity and temperature of the atmosphere, while the hand adjustment comes in handy when a new belt is fitted which may not be exactly the same length as the old one.



Above—Camshaft setting and timing diagram for normal operation. Below—Camshaft setting and timing diagram for braking by the engine

The governor is of the centrifugal type, the spider to which the governor weights are pivoted being keyed to the shaft. The governor weights are in the form of bell cranks, the inwardly extending arms engaging into a groove on the governor sleeve, upon which latter acts a coiled compression spring tending to hold the weights close to the shaft. The sleeve is formed with a collar which acts on a short lever carrying a roller in contact with the collar. The downward extension of this lever connects by a rod to a lever on the governor cross shaft, which extends through the upper part of the crankcase to the throttle valve on the opposite side of the engine.

Provision Made Against Back Kicks

Back of the governor sleeve the shaft is hollow and has the magneto driveshaft piloted in it, the magneto being driven through a positive clutch. Surrounding the governor shaft is a sleeve which can be moved axially by the spark control lever on the steering wheel.

This sleeve is provided with inwardly extending pins or keys which pass through straight slots in the main shaft and into helical keyways in the magneto shaft. Therefore, if the spark lever on the steering wheel is moved the magneto shaft is advanced or retarded relative to the driving shaft, the result being that the spark always occurs when the electromotive force induced in the primary winding of the magneto armature is a maximum. This obviates difficulty in starting owing to weak sparks and gives better ignition throughout the range of spark advance. The magneto is a Scintilla.

Provisions are made on this truck to prevent the possibility of back kicks in starting due to failure of the operator to previously set back the spark. The ignition shaft lever outside the governor chamber is provided with two pins. To the upper of these connection is made from the spark lever on the steering wheel. A spring connection is inserted in this linkage at the bottom of the steering post, which permits of retarding the spark by acting on the spark control shaft even though the spark lever on the steering wheel may be set for early ignition. A connection is made from the lower pin on the spark control lever to a device in front of the engine which is actuated by engaging the starting crank. Engaging the starting crank compresses the spring in the linkage from the spark lever on the steering wheel to the spark control sleeve and sets the magneto for late ignition. As soon as the starting crank is withdrawn, the timing determined by the setting of the spark lever is automatically restored.

An exclusive feature of the Saurer truck is the engine brake. Of course, any truck or passenger car can be allowed to coast on the engine by engaging one of the lower gears and closing the throttle, but the retarding effect of the ordinary engine is so small that it cannot be utilized on the higher gears, and to serve as a brake at all the engine must therefore turn over at tremendous speed, which subjects its parts to great strains.

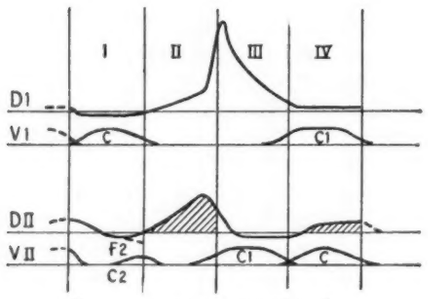
Engine Brake Is Novel Type

Besides, it is not always possible to engage one of the lower gears when the car is traveling at considerable speed and has to be brought to a stop. The low efficiency of the conventional engine as a brake is due to the fact that the air compressed in the cylinders during the compression stroke, expands again during the following stroke, hence most of the power consumed during the compression stroke is returned during the next stroke, while during the exhaust stroke the exhaust valve is open and no air can be compressed in the cylinders.

To overcome these difficulties, in the Saurer engine the cycle is completely changed when the engine is wanted for braking purposes.

To this end the camshaft is arranged so it can be moved axially in its bearings, and the camshaft gear, instead of being secured to the shaft in a rigid manner, is mounted on a steep pitch, square thread at the forward end of the shaft the hub of the gear being cut with a corresponding internal thread. The camshaft gear is held against longitudinal movement by its ball bearing, and the camshaft itself is provided with a shifter groove at its forward end into which engages the end of a lever connected by a linkage with the throttle control lever on the steering wheel.

When the throttle control lever is turned around its axis, after the throttle has been closed, any further movement moves the camshaft forward and at the same time, owing to the helical keys connecting it to the camshaft gear, rotates it around its axis. If the lever is moved to the limit, the camshaft is rotated through an angle of 75 deg., which completely changes the valve timing dia-



Pressure-volume and valve opening diagrams

D1 — Pressure-volume diagram corresponding to engine cycle.
V1 — Valve opening diagram corresponding to engine cycle.
DII—Pressure-volume diagram corresponding to brake cycle.
VII — Valve opening diagram corresponding to brake cycle.

gram. Since one degree of camshaft rotation corresponds to two degrees of crankshaft rotation, each point of the timing diagram is retarded by 150 deg. of crank motion.

The axial motion of the camshaft also brings into action a small auxiliary cam, the object of which is to aid the suction in the cylinder in lifting the inlet valve during what corresponds to the power stroke in normal operation. When the camshaft is in the braking position the operations in any cylinder of the engine during the four strokes of a cycle are as follows:

Referring to the valve timing diagram for braking, during the first down stroke (ordinarily the inlet stroke) the exhaust valve is closed, while the inlet valve remains open only to point 2, closing 150 deg. earlier than normally. At this time there is a slight over-pressure in the cylinder and manifold, as will be explained in connection with the fourth stroke. As the piston continues its stroke, the air in the cylinder expands and presently (at point 5) the suction in the cylinder becomes sufficient to lift the inlet valve from its seat, admitting air from the manifold to the cylinder. This is indicated in the pressure diagram D, where the pressure follows the full instead of the dotted line at this point of the cycle.

During the following up-stroke the exhaust valve remains closed and the auxiliary cam C_2 allows the inlet valve to close at point 6. Thereafter the air is compressed in the cylinder to near the top of the stroke. At point 3 the exhaust valve opens, allowing the air to escape to the atmosphere. It is during this stroke that the greatest amount of energy is absorbed and the brake is therefore most effective. During the third stroke the exhaust valve remains open, allowing the air first to escape and then to be drawn back into the cylinder.

Valve Timing

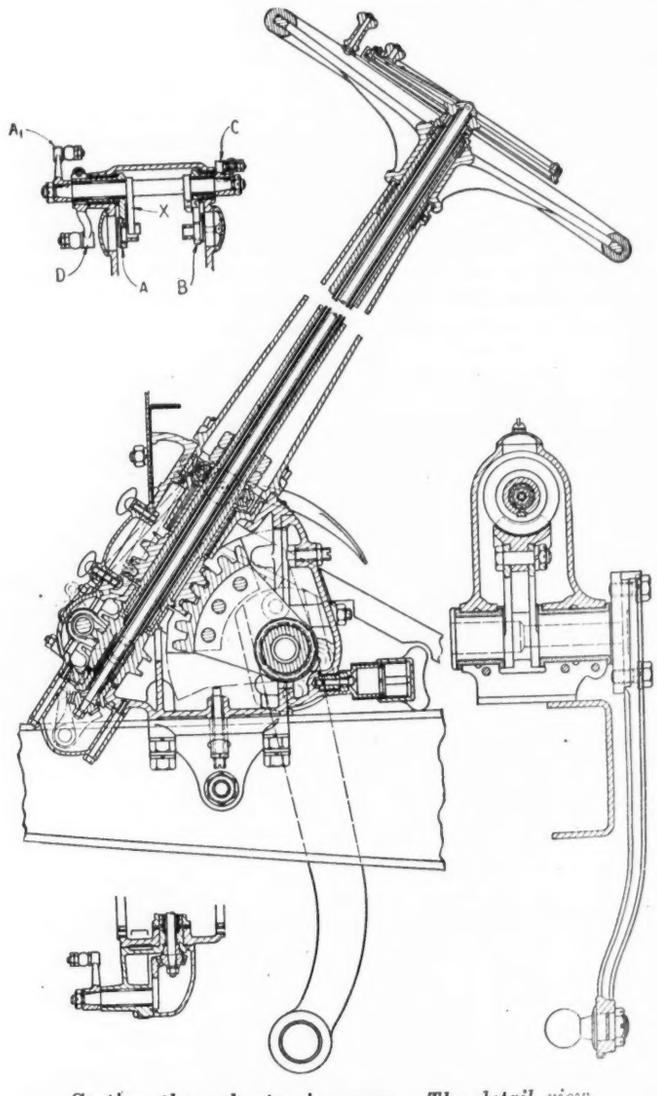
The fourth stroke is an up-stroke again, and as the exhaust valve closes at point 4, the air would be compressed in the cylinder were it not for the fact that the inlet valve opens at point 1. At this point the pressure within the cylinder is equal to atmospheric, while the pressure in the inlet manifold is about 20 per cent greater, hence the opening of the inlet valve has the effect of increasing the back pressure on the piston and the pressure gradually rises toward the end of the stroke. The braking effect during this stroke is much less, however, than it would be if the inlet valve did not open and the charge of air were compressed in the cylinder. Under the conditions described the effect of the engine brake is a maximum, and it can be reduced by moving camshaft to intermediate position.

An important advantage of the engine brake is that the kinetic energy of the truck is largely absorbed in compressing and heating air, instead of in heating and wearing down friction material.

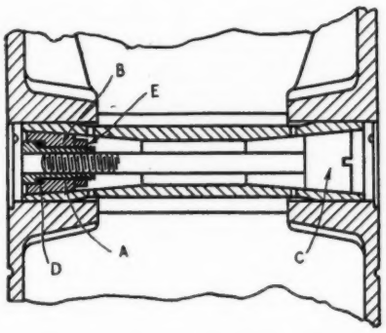
The inner lever on the steering wheel is the spark advance lever and the outer one opens or closes the throttle while moving on the right hand half of the stationary wheel and applies the engine brake while moving on the left hand half. This arrangement automatically ensures the closing of the throttle before the engine brake is applied. The ignition control rod is arranged inside the tube supporting the stationary control wheel while the throttle and brake control tube surround this stationary tube.

Throttle Control

The throttle control tube at the bottom carries a sleeve in which there is a cam groove in which are located two rollers, one at the end of lever A forged integral with the short hollow shaft on the left side, the second on the end of lever B forged integral with the short hollow shaft on the right-hand side. From lever A a link extends to the camshaft control lever at the forward end of the engine. On the central cross shaft are two levers C and D, C being connected to the accelerator pedal and D to the governor lever and thence to the throttle. The short arm on the right-hand side is provided with a lateral set screw passing



Section through steering gear. The detail view in the upper left-hand corner shows the connection between the throttle lever tube, the throttle valve and the camshaft shifting mechanism



Details of the piston pin and its locking mechanism

through an oblong slot in lever B, which forms a lost motion link for the hand and foot controls of the throttle. Arm X in the drawing interlocks the engine brake with the accelerator mechanism, so that the engine brake cannot be applied when the accelerator pedal is depressed. The pins carrying the rollers on the levers in the steering gear housing are made eccentric, and can be adjusted through an opening in the side of the housing to vary the travel of the links.

The lengths of all rods can be adjusted and the connections are by eyes formed integral with the rods, taking hardened steel bushings on shoulder pins that are secured in the arms by a nut and lock nut. It will thus be seen that while the control mechanism comprises many parts, it is carefully laid out and thoroughly well made, and its seeming complication need not cause any apprehension.

Three-point support is used for the unit power plant. There is a large spherical support on the front cross member of the frame, which is carried on a coiled spring, and there are two additional supports on a frame cross member passing underneath the rear end of the gearbox.

The clutch is of the cone type, separate from the flywheel and having a driven member of pressed steel. Slots are cut into the driving cone and the resulting segments bent slightly inward to ensure more gradual engagement. The clutch-throw-out mechanism runs in a compartment at the forward end of the gearcase, in an oil-bath, properly packed at the forward end to prevent loss of oil to the clutch compartment.

The gearset is of the conventional sliding pinion type giving four forward speeds and one reverse. It is mounted on ball bearings throughout, even the pilot bearing being of the ball type. The gear housing is made of aluminum, in two parts, divided in a horizontal plane through the axes of the shafts. The lower half is extended forwardly to form a clutch pit, and bolts to a bell housing formed on the engine crankcase, and it is also extended rearwardly to form a housing for the universal joint. All of the ball bearings are mounted in bushings of hard metal instead of directly in the aluminum of the case, and a bushing is provided in line with the secondary shaft at its forward end to support a power take-off which may be required to operate a tipping mechanism, etc. The shaft on which the gears slide is of the four splined type and it will be noticed that oil grooves are cut at the bottom of the spline grooves.

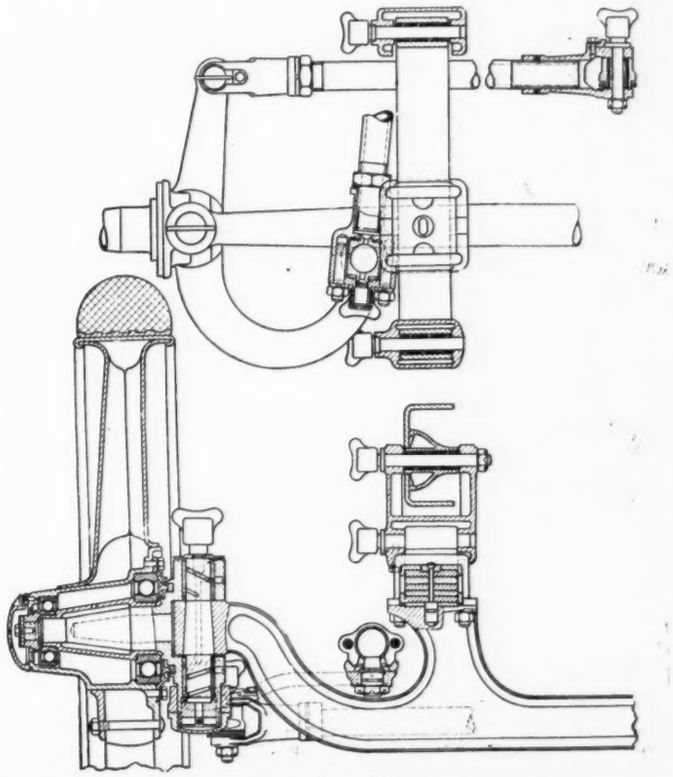
Special Rear Axle Construction

There are two features which distinguish the rear axle from conventional truck axles. The first is that it has a bevel gear drive, which is unique in trucks of this capacity, and the second is that the axle is slightly arched, the same amount as the front wheel spindles. The object aimed at in arching the axle is to minimize tire wear when traveling on crowned roads. It has been found with trucks without this feature and which have their wheels shod with wide dual tires, that the wear on the inner tire is always greater than that on the outer one. This is due to the fact that the axle under its load sags in the middle, assuming a shape convex toward the road, and as the road surface often is convex itself, it is obvious that the outer tires will press against the road with much less force than the inner ones, with consequently less wear upon them. Arching equalizes the wear between the inner and outer tires.

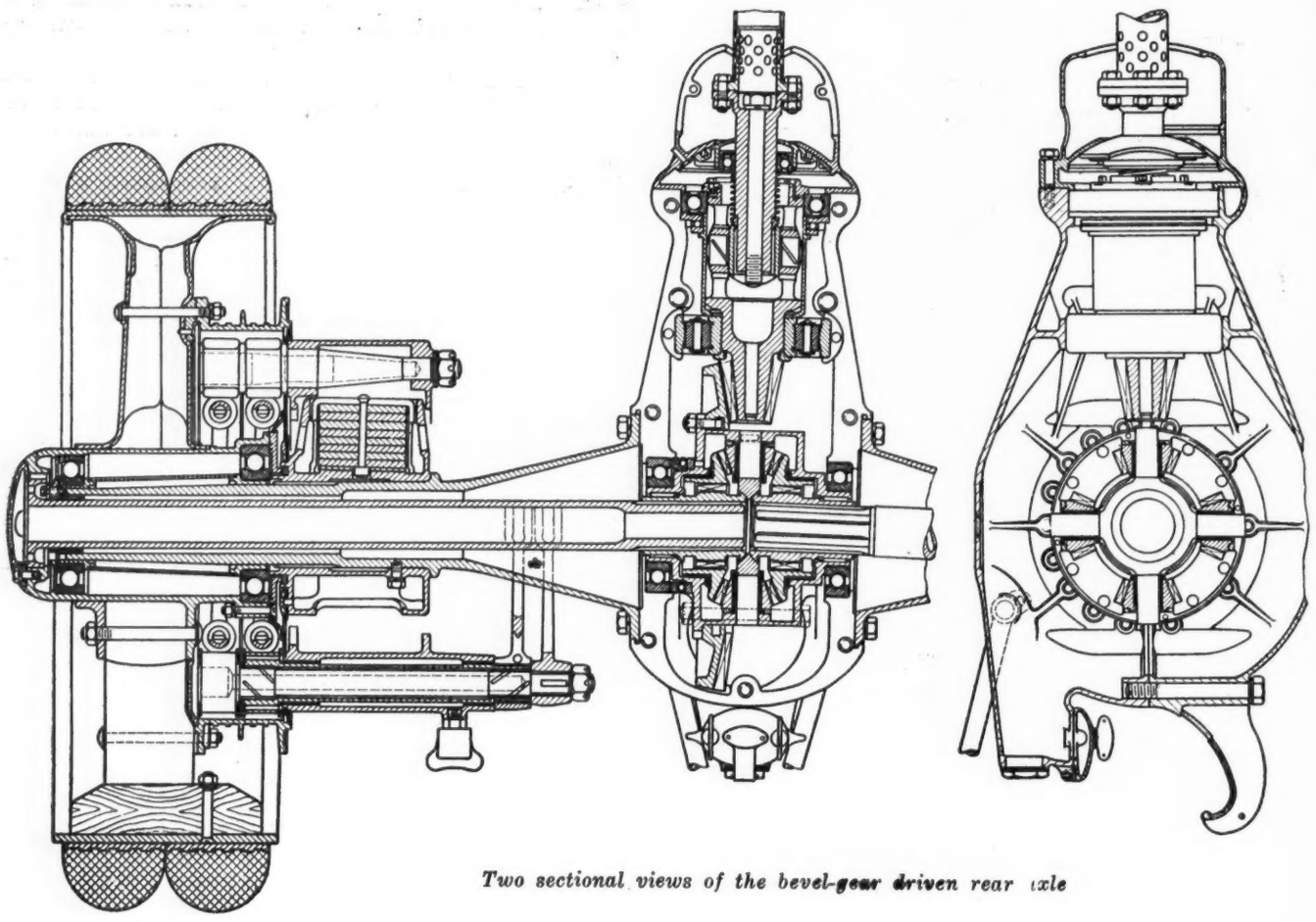
To permit arching of the axle, the axle shafts must be connected to the differential gear by means of some form of universal joint. This joint is of the internal-spur gear type, the internal teeth being cut in the hubs of the differential side gears, which latter have their bearing in the differential housing. The part carrying the spur teeth is splined to the chrome nickel steel axle shafts which latter are hollowed out to reduce the unsprung weight. At their outer ends the axle shafts are forged with a flange forming a driving dog, the axle being of the full floating type. The differential case is made of cast steel and is supported in ball bearings, only the bearings within the differential itself being of plain bushed type. End thrust is taken by the inner one of the two large ball bearings within each rear wheel hub.

There are only seven teeth in the bevel pinion of the final drive, and with a rear axle ratio of 8 the diameter of the crown gear is by no means excessively large, the clearance under the differential housing being 11 in. The bevel gears have a rather wide face and in view of the heavy load on the bearing directly back of the pinion, this is made of the roller type.

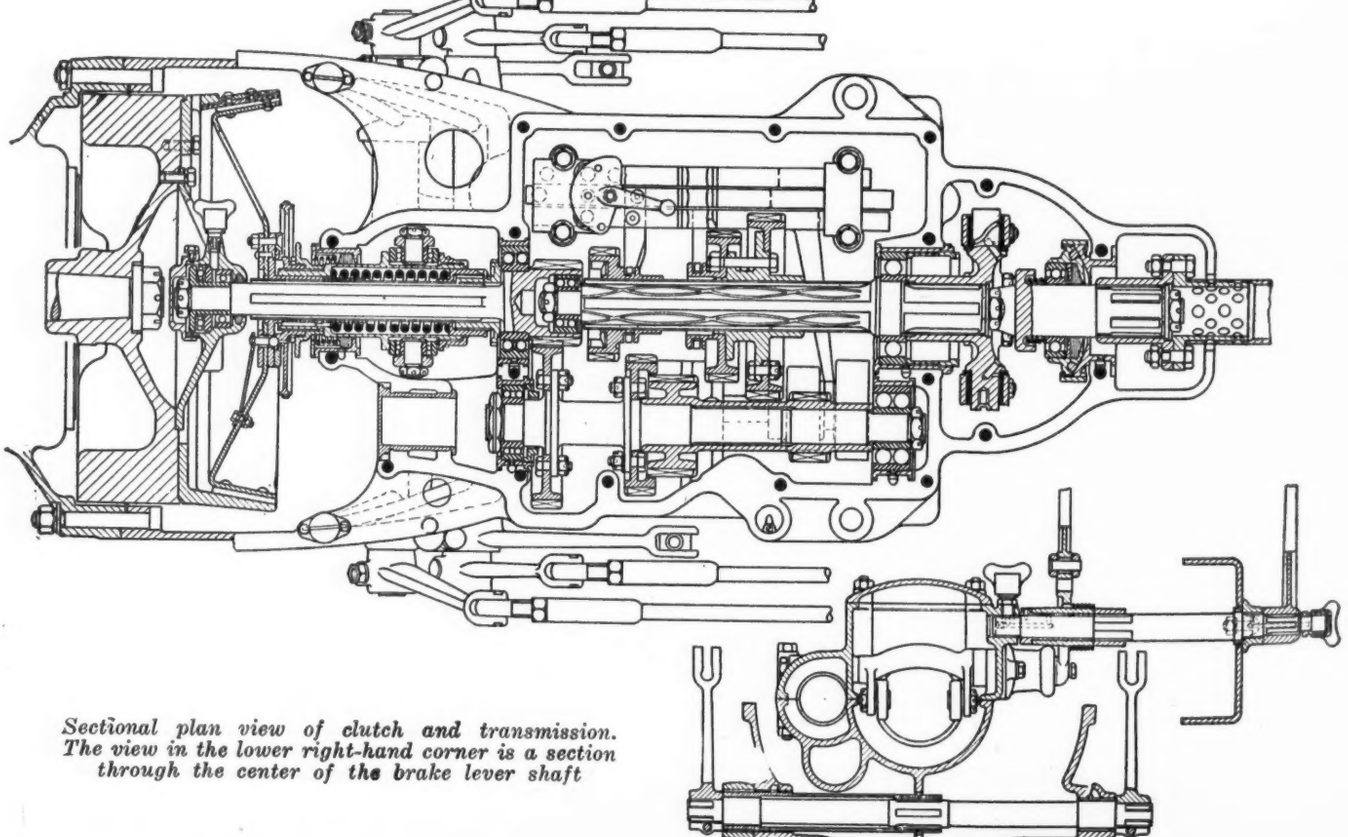
Pinion and shaft are made integral and are hollowed out. There is really no shaft, because the forward extension of the pinion, located between the roller bearing directly in front of the pinion and the ball bearing at the forward end of the member, forms the outer member of a combined sliding and universal joint of the block type. This universal joint is located within the axle housing and therefore operates in an oil bath. Attention may be called to the oil-retaining arrangement at the forward end of the differential case, the retainer being of spherical



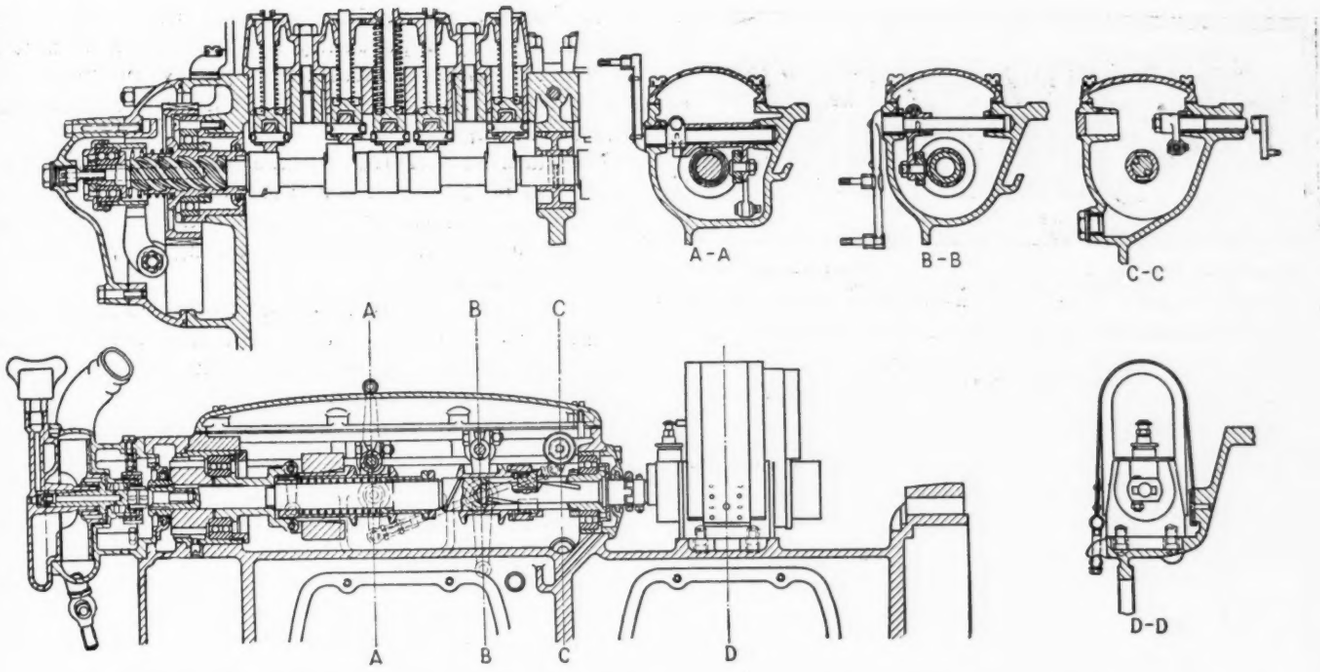
Front axle, steering knuckle and connections, showing raised spring perch



Two sectional views of the bevel-gear driven rear axle



Sectional plan view of clutch and transmission. The view in the lower right-hand corner is a section through the center of the brake lever shaft



Upper left-hand corner: Forward end of camshaft, showing means of shifting and varying the timing of the camshaft, as well as details of tappets and camshaft brake. Lower left-hand corner: Section through governor, pump and magneto drive. The other views in the illustration are cross sections in the planes indicated

segment form and riding on a ball bearing on the propeller shaft. Thrust on both the pinion and the gear of the bevel drive is taken up on special ball thrust bearings. The crown gear is recessed to the differential housing, so that the joint through which the drive must be transmitted is very strong.

The differential housing is made of cast steel and is split in halves in a horizontal plane. Trumpet-shaped axle tubes are recessed into the housing on opposite sides and bolted to it. These tubes carry the combined spring saddles and brake supports, which are keyed to them, because both the driving thrust and the torque are taken by the springs. The propeller shaft is very long, hollow and of large diameter, hence there is little universal action and no danger of whirling of the shaft at high speeds.

Both sets of brakes act on drums bolted to the steel rear wheels, the two sets being arranged side by side. The wide drums are ribbed, both for increased rigidity and to help carry off the heat. The camshafts for the two sets of brakes are arranged concentrically and the inner one is made hollow to reduce weight. The brake shoes are made of cast iron and bear on the steel drums without liners. The brake rods are of unusual length, extending all the way from the cross shaft at the clutch pit to the rear axle, and are made of oval tubing 1½ in. in depth.

No Equalizer on Brakes

No equalizing device is provided, the flexibility of the cross shafts being depended on to ensure equal division of the force of application between brakes on opposite sides. By reference to the drawing showing this feature, it will be seen that the cross shaft is surrounded by a tube which latter receives the brake-applying force through a lever at one end and transmits it to the cross shaft to which it is keyed at its other end, the point of keying being at the middle of the chassis. The tube is evidently an extra piece, intended merely to ensure that the sections of the cross shaft between the points where torque is applied to it and the two points at which it is taken off, are of equal torsional stiffness. This same arrangement is used for the linkages of both rear wheel brakes.

A forked lever on the brake pedal shaft carries a swivel block through which passes the operating rod to the cross shaft lever. The end of the rod is threaded and can be shortened or lengthened by means of a hand wheel directly below the footboards, for brake adjustments for wear. The hand brake lever shaft passes across the top of the gearbox inside the gearshift shaft to a swivel block on the left side and is connected to its cross shaft by a similar arrangement. Adjustment of both brakes may be made while the truck is under way.

Front Axle Ends of Reverse Elliott type

The front axle is a nickel steel forging of I section; its center is dropped below the level of the steering spindles and the spring pads are raised several inches above the axle proper. The axle ends are of the reverse Elliott type.

Excellent features are embodied also in the drag link. This is made of soft steel tubing, its ends enclosing two hardened steel cups in which the balls of the steering gear arm and of the knuckle arm work. Shims are inserted between the cups and their seats.

The steering gear is of the same grade as usually fitted to passenger cars, the wheel comprising an aluminum spider and a hard rubber rim. This wheel is keyed to the tubular shaft, which is arranged inside a cast aluminum post recessed into and bolted to the steering gear housing. The steering gear itself is of the worm and sector type, and a bronze bushing and ball thrust bearing are fitted at the lower end of the column to take up radial and thrust loads on the worm, respectively.

There is an additional bronze bushing below the worm, which is thus well supported. The same as the worm, the worm wheel sector is made of hardened steel, and it is fitted between flanges formed integral with the hollow worm wheel shaft. The outer end of this shaft is formed with a flange which is recessed to take the steering gear arm, which is held in place by two bolts. This arm is designed to act as a weak link in the steering gear train and to bend in case of excessive shocks to the steering wheels.

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Subscription Rates
United States, Mexico and U. S. Possessions ..... $3.00 per year
Canada ..... 5.00 per year
All Other Countries in Postal Union ..... 6.00 per year
Single Copies ..... 35 cents

Entered as second-class matter January 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations
Member, Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

THE CLASS JOURNAL COMPANY
U. P. C. Building, 239 West 39th Street, New York City
Horace M. Swetland, President
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Support the New York Show

EXPERIENCE alone will determine whether or not attendance at the New York automobile show, held in an armory in the Bronx, will be comparable to the crowds which have thronged the Grand Central Palace in other years. It would be surprising if the figures were as large, but it is more than probable that all those who journey eight miles from Times Square to see the displays will be genuinely interested in motor cars. The net result, therefore, is likely to be fully as good.

Marking, as it does, the beginning of the spring buying season in the East, the show deserves the support of the entire industry because it serves all manufacturers, no matter in what branch they may be, to as great a degree as it does dealers and distributors. It affords an opportunity to display new wares and bring them before the public to the best advantage. It gives sales managers a chance to meet the men who actually sell cars at retail.

More important even than this consideration, however, is the fact that it marks a real convention of the industry. It serves as a point of contact for men with common interests who seldom meet. It brings together manufacturers of vehicles, parts and accessories, factory executives, jobbers, distributors and dealers, giving opportunity for discussion of mutual problems. Such conferences, partly business and partly social, do much to iron out differences and misunderstandings.

No justification for failure to support the next show can be found in the fact that it will be held in the Bronx. There was no other place to go because insuperable obstacles had arisen against continued use of the Palace.

The 1924 exposition promises to be the finest of its kind ever held in any country and it's up to everyone to pull as hard as possible to make it a tremendous success in every respect.

Diagnosing Traffic Problems

CORRECT diagnosis is necessary before a cure can be effected.

It is quite logical, therefore, that the new traffic planning and safety committee of the National Automobile Chamber of Commerce should have decided to make a nation-wide survey to determine the major causes of traffic accidents before attempting to formulate means for reducing the number of casualties. If the committee continues its work with the same degree of sanity and there is every reason to suppose it will, practical results are likely to crown its efforts.

The problems of traffic congestion and traffic accidents are so closely related that it is difficult to determine where one ends and the other begins. When congestion of traffic is relieved, the number of accidents, especially to pedestrians, will be automatically reduced. For this reason it would seem that intelligent traffic planning is a prerequisite to accident prevention.

Some broad visioned agency which could operate on a national basis and thereby bring about a degree of uniformity in traffic reforms has been sadly needed and it should be highly gratifying to the entire industry that the N. A. C. C. has come forward to do the work. The committee will need all the support it can get and cooperation should be given without stint.

International Highway Transport

INTERNATIONAL phases of highway transport will assume added significance in 1924. With the United States far ahead of all other nations in the production and use of motor vehicles it is quite logical for it to assume leadership in promoting a coordination of effort which will put the whole world on rubber tires.

Three events of major importance within the next six months will be the Pan-American Road Congress, the English Speaking Road Congress and the World Motor Transport Congress. All of them are being fathered and fostered by the automotive industry. Delegates attending the first two will be taught American road building ideas and ideals, while those who participate in the third will consider not only highway but legislative and merchandising problems.

It is none too early for other countries to learn that

unduly restrictive regulatory measures, designed to preserve good roads, can so stifle motor transport that the roads might just about as well not have been built.

Just as an example, the Ohio courts have held that a truck and a trailer constitute a single vehicle and that the load carried on both of them must not exceed the maximum established by law for a truck. We venture to risk contempt of court by admitting that we can see no logic whatever in such an argument.

Statistics Must Be Up to Date

ACCURATE statistics about automotive manufacture already have proved their usefulness. Analysis of registration, production and distribution figures has enabled car and truck makers to plan future activities intelligently and to carry on their business at much lower costs than otherwise would have been possible.

Further up-to-date information concerning other phases of the industry also would be useful. The census of manufactures provided periodically by the Bureau of Census contains much material which cannot be found elsewhere.

The trouble with previous reports of this kind has been that they have been published so late as to be of relatively little value. Often publication has come two years after the date to which the figures refer.

The Bureau of Census is now engaged in collecting statistics of manufacture covering the calendar year 1923, and a very definite effort is being made to complete the survey at the earliest possible moment. Questionnaires are to be mailed to manufacturers on Jan. 2, and the rapidity with which replies are received will determine the publication date of correlated returns.

Ford Again Shows Good Sense

HENRY FORD has again shown his good sense by announcing that he will not be a candidate for President on any ticket. He bases his stand upon respect for President Coolidge and advocates his reelection. If every one would agree with him, he says, there need be no business disturbance because of the Presidential campaign. Everybody won't agree, however, and the campaigning will proceed as usual. But Ford has retired with his hat on his head without revealing his political affiliations, if he has any.

We never have believed Ford was obsessed with a desire to live in Washington. As long ago as Jan. 25 AUTOMOTIVE INDUSTRIES said:

"It is certain Ford is not making the Herculean efforts sometimes attributed to him to get into the White House.* * * We do not believe that Ford is spending money lavishly in devious ways to win a nomination. He's a keen student of human nature and he's not likely to repeat the mistake which took Truman Newberry out of public life."

Nor do we believe Ford bartered a pledge to support Mr. Coolidge in exchange for a promise of administration aid in getting control of Muscle Shoals. Ford's bid for the power of the Tennessee River was made upon invitation of the War Department and he will not die of disappointment if he fails to get it.

Mr. Coolidge believes, quite rightly, that Muscle Shoals should be turned over to some one who will produce fertilizer in time of peace and nitrates in time of war, using the rest of the power available for industrial development. And that's that.

Deterioration of Crankcase Oil

OF late years automobile manufacturers and oil refiners have advised users to change their crankcase oil after about 500 miles of running. This is a much smaller mileage than was formerly obtained from lubricating oil with entire satisfaction, and the decrease is said to be due to the more rapid dilution of the oil resulting from the change in character of our fuel. There seems to be some difference of opinion, however, as to the exact way in which dilution acts to shorten the life of the lubricant.

The object of the lubricating oil is to form a film between the metal surfaces of the bearings, so as to prevent metallic contact and consequent abrasion. As the oil becomes diluted by the heavy, unvaporized ends of the fuel that work by the pistons, its viscosity decreases, and at the same time the thickness of the film separating the bearing surfaces becomes less. However, along with dilution another change in the character of the crankcase oil takes place—it becomes contaminated with particles of solid material which are sufficiently hard to act as an abrasive. These solid particles originate from three sources.

All bearings become worn in the course of time, and the material worn off their surfaces naturally enters the oil. Such wear probably takes place at the most rapid rate when the engine is new and its surfaces have not yet acquired that glass-like polish that comes with continued operation under favorable conditions. Gritty carbon is formed by the coking of the oil on the under side of the piston, as well as in the combustion chamber, and some of this constantly shakes loose and enters the oil supply. Finally, cars sometimes operate over exceedingly dusty roads, in which case dust particles of a gritty nature are taken into the engine both with the carbureter air and through the crankcase breather.

As long as the oil film separating the bearing surfaces is comparatively thick, little harm is done by this gritty material, most of which is of comparatively fine grain. But as dilution continues the bearing surfaces approach closer and closer, until the distance separating them is less than the diameter of the average grain, when a regular scoring action begins. Dilution, moreover, accelerates the introduction of gritty material into the oil in some ways, for with a thin oil in the crankcase there is more oil pumping and more carbonization, and the detachment of metallic particles from the bearing surfaces when the engine is first started is also promoted by thinness of the lubricant.

Deterioration of the crankcase lubricant, therefore, is not due to dilution alone but to dilution in conjunction with the introduction of gritty material.

4,000,000 Indicated as Output This Year

December Operations Keep Up Despite Inventory Taking in Some Factories

NEW YORK, Dec. 24—That total production of automobiles and motor trucks for the year now closing will be in excess of 4,000,000 is indicated by the activity in producing centers during December. Output for the eleven months ended Nov. 30 approximated 3,723,000.

Good Operations in Some Plants

While operations have been curtailed in many automobile plants, due to inventory taking and readjustment of manufacturing facilities, they have been maintained at a good rate in others, which will result in a relatively high aggregate output. There has been a tendency on the part of major producers to shorten the inventory period this year so that there would be as little interruption as possible to operations. December totals will compare favorably with other months of the present year and will show a substantial increase over December a year ago, when production reached 228,252.

Open weather in sections of the country has acted as a strong sales impetus, keeping demand at a higher point than was expected at the beginning of the season. Sales show unusual strength for the period, which may be accounted for not only by the mild winter, but because of the greater holiday buying of automobiles. Improvement in sales is expected to follow the holding of the New York show next month, and at the same time manufacturers will be ready to swing toward capacity production.

Parts Inventory Period

Parts makers are passing through the inventory taking period, but are reducing the time when plants are actually shut down. Specifications from motor vehicle builders call for steady operations without any evidence being presented that manufacturers are pressing the parts makers, as was the case a year ago. No departure is being made from original delivery specifications, this reflecting a more stabilized condition throughout the industry. The parts branch is operating on a sound, healthy basis, with prospects for a continuance of good conditions for the first quarter of the new year at least.

The year will close with the truck branch of the industry somewhat nearer its former status, but with some distance yet to go to reach normal. Marked progress has been made during the year, but the advance has been along conservative lines with no such spirited movement forward as featured passenger car activities. This was to be expected, schedules being governed solely by the actual demand in the industrial field.

(*Continued on page* 1331)

Business in Brief

NEW YORK, Dec. 24—Reports from all sections of the country indicate that holiday buying has surpassed all previous records. In direct contrast to strictly gift buying, retail purchasing has been generally retarded by weather conditions. Quiet has also reigned in the wholesale and jobbing field but a bright future is seen for both fields.

As might be expected car loadings increased over the week previous by 78,478 cars, making a total of 913,774 cars for the week ending Dec. 8. This total is 4600 cars greater than loadings for the same period last year and 170,848 greater than in 1921. Total loadings for forty-nine weeks of 1923 aggregate 46,723,760 cars.

Crop conditions are fair. Winter wheat is in a good position but the corn crop suffered from the delay in husking due to inclement weather. Exports of wheat and corn have declined slightly from the week previous. Marketing of hogs and cattle continues on a high plane and new records have been established.

Instead of falling off as might be expected, steel output has kept up a steady pace to supply orders for building construction and from automobile and railroad equipment buying. Pig iron prices are firmer and tin plate mills are at the highest rate of the year.

A turn for the better is noted in the petroleum industry. Prices have increased in Pennsylvania crude. Improved tone is attributed to a decline in production in California and Texas fields.

Aggressive attacks on the market caused stocks to lose heavily. Much of this was due to desire to get cash for the holidays and to record losses for income tax purposes. Rumors regarding the possibility of passing the bonus was an unsettling factor, but recovery was experienced later when the possibility of this was pointed out to be more remote with tax revision having priority. Bonds were active and irregular. French exchange made a new low record.

R. H. Collins Resigns Peerless Presidency

His Son Has Also Retired—D. A. Burke, Sales Director, Made General Manager

CLEVELAND, Dec. 26—The resignations of R. H. Collins as president and of his son, W. H. Collins, as vice-president and director of the Peerless Motor Car Co. were read and accepted at a meeting of directors of the automobile company this afternoon.

D. A. Burke, present vice-president and sales director, was immediately elected general manager, H. C. Robinson, vice-president of the Guardian Savings & Trust Co., was elected a director to fill the vacancy caused by the resignation of W. H. Collins.

Executive Committee Chosen

An executive committee consisting of Fred R. White, chairman; C. E. Sullivan, president of the Central National Bank of this city, and H. A. Tremaine, local financier and former holder of the controlling interest in the company, was elected by the board, which also passed a resolution providing for meetings twice a month in order to bring them more closely in touch with the operations of the corporation.

Whether Burke is to remain permanently in charge of the company with the Tremaine interests supporting him is not known. It was stated that a successor to Collins has not been named.

The resignations and the creation of the supervising committee will not change production plans for 1924. Work has gone forward in the development of the new six-cylinder car, which was designed by Collins while in Detroit and sold by him to the Peerless company for approximately half a million dollars.

New Car Is Peerless Six

This new car will be shown for the first time at the New York Show, and the production plans for this car will be carried out. It is to be known as the Peerless Six, and under present plans will sell for under $2,000. The eight-cylinder Peerless also will be manufactured and sold.

The directors expressed regret that Collins should find it necessary to resign, and the secretary was instructed to express official regrets to Collins and his son, who are in California.

The directors expressed gratification over the financial condition of the company and declared the regular quarterly dividend of $1 per share.

Collins took control of the Peerless company in November, 1921. He purchased 79,662 shares of the stock at $50 each, enough to give him control. The company's business improved and finally the stock sold up as high as 86.

(*Continued on page* 1330)

Call for Transport Conference Issued

Will Be Held in Washington in January Under Auspices of U. S. Chamber

WASHINGTON, Dec. 26—A national conference on transportation has been called by the executive officers of the United States Chamber of Commerce for this city on Jan. 9, 10 and 11.

Invitations have been sent to approximately 200 leaders in the automotive, agricultural, commercial, financial, industrial and railroad fields, to take part in the deliberations and to discuss the multiplicity of problems involved in the development of an adequate national transportation system from a railway, highway and waterway viewpoint.

There is no more pressing problem before the public today, the Chamber declares, than that of transportation. For this reason not only are the views of the railroads, motor transport companies and waterways carriers sought, but also the views of the farmer, labor organizations, public officials, editors and publishers are sought.

Seven Problems to Be Discussed

In order that the delegates may have something in the nature of a constructive program to work upon, the Chamber has decided through its Special Committee, which for the last eight months has been studying the nation's transportation needs, to submit seven major problems for discussion and such constructive action as the delegates might recommend. These are:

(1) What is the probable future of transportation growth?

(2) Where does highway and motor transport promise its highest service to both the public and the motor transport companies?

(3) What principles of regulation, Federal and state, protect the public interest and yet encourage motor and other forms of transportation expansion?

(4) What policies promise to attract the necessary capital and credit?

(5) What principles of rate-making hold most fairly the scale of relative rates?

(6) How can water highways contribute their fullest service?

(7) Within what formula can all transportation develop the stimulant of private initiative and enterprise in the very interest of expanding service and the utmost economy of operation?

Income from Transportation

On the first question under consideration, on the probable growth of transportation cost, the Chamber points out that in 1890 the national income, earned only through transportation and distribution was $12,000,000,000; in 1900, $18,000,000,000; in 1910, $32,000,000,000 and in 1920, $60,000,000,000.

The idea of a conference which would consider the problem of transportation from the national viewpoint was first suggested at an informal meeting last January by interested parties.

In accordance with a resolution adopted at this meeting the Chamber appointed six composite committees to undertake the study of as many phases of the transportation problem with the aid, so far as available, of the agencies of the Government and private organizations.

The reports of these committees, their findings and recommendations will also be made the basis of discussion by the delegates, and will deal with (1) Government relations to Railroad Transportation; (2) Railroad Consolidation; (3) Readjustment of Relative Freight Rates; (4) Relation of Highway and Motor Transport to Other Transportation Agencies; (5) Development of Waterways and Coordination of Rail and Waterway Service, and (6) Taxation of Transportation Agencies.

Prospect for Continuance of Buying in Large Volume Is Good on Eve of New Year

AN INTERVIEW WITH ARTHUR VON SCHLEGELL,
Vice-President of the Hupp Motor Car Corp.

By D. M. McDonald,
Detroit News Representative of the Class Journal Co.

Detroit, Dec. 26.

THE general financial and economic situation in the United States as it confronts the industry on the eve of 1924 is of the brightest, declares Arthur von Schlegell, vice-president of the Hupp Motor Car Corp. This, coupled with the fact that the automobile has gained a place in popular favor which has made it desirable in the lives of practically every American, bespeaks the certainty of the continuance of large volume buying.

Used cars present the one difficulty of any importance, where the question of the year's business outlook in the automotive industry is considered, he stated, but there is hardly reason to consider the used car as a serious problem in view of the experience of the industry.

For a number of years there has been an accumulation of used cars at certain seasons from various causes, and these have led to much pessimistic conjecture only to find that with changing seasons and conditions, these cars have found ready markets. The present year is no exception, he said, and there is no reason to believe that whatever used cars have been tied up will not move rapidly with changing seasons.

The factors that have made used cars a serious problem for dealers over a period of years will give way as dealers become more experienced in their conduct of their businesses. There is every reason to believe that dealers are gradually correcting this feature and with greater experience will so regulate it that it will become part of a well ordered routine.

As part of the correcting process, Mr. von Schlegell sees a lessened aptitude for trades at any cost and the development of a well defined system of values which will make for ready turnover of cars taken in trade at a profit. Lower appraisals will lessen somewhat the avidity with which owners formerly turned used cars in on new cars, and will result in many first owners using their cars for longer periods than they have formerly done.

Longer use of cars by original owners will affect the new car market to some extent, declared Mr. von Schlegell, but this will not be noticeable in any one year, because it will come about gradually as have most changes that the industry has experienced.

Car reputations will be heightened or lowered as cars are retained in longer use by first owners. Many owners never have had an opportunity to know their cars, but longer use will establish merits which only have been suspected. New standards of values will be developed and thus as owner experience becomes more complete, the actual values of cars at different periods of their use will become more clearly defined.

Developments of the new year as regards the used car will be undoubtedly a movement toward more accurate appraisal of cars according to the price at which they can be resold. Market conditions govern the prices of all commodities and the used car having a definite market must be offered at prices attractive to buyers.

Remy Takes Possession of Plant Sold by Arvac

ANDERSON, IND., Dec. 24—The Remy Electric Co., which recently purchased an additional plant from the Arvac Manufacturing Co. of this city, has taken possession and after the first of the year will be in full production.

Starting motors will be built exclusively in the new plant, leaving more space available at the main plant for the manufacture of generators, ignition distributors, coils, relays and switches. There now are 3650 men and women on the Remy payroll, and the recent acquisition adds 85,000 ft. of floor space and ten acres of ground to its capacity.

The main plant comprises more than 455,000 sq. ft. of floor space, covering eight acres of land.

Bus Axles to Be Made by Lobdell Interests

Atlas Axle Co. Formed in Wilmington, Del., with Joseph Stuart as President

WILMINGTON, DEL., Dec. 26—The Atlas Axle Co. has been formed by interests affiliated with the Lobdell Car Wheel Co. of Wilmington for the manufacture of a new type of low-level driving axles for motor buses.

The device has been tried out in Philadelphia, and an order has been placed for 100 to be used in a regular urban bus service in that city. The device is manufactured at the plant of the Lobdell company, which is at the junction of the Delaware and Christiana Rivers, giving handy water and rail facilities for shipment.

Joseph Stuart, vice-president of the Lobdell company, is president of the Atlas company; Richard R. Whittingham, son of the inventor of the device, is vice-president and chief engineer, and Howard L. Seaman is secretary and treasurer of both companies.

The axle has an approximate weight, with wheels, of 1760 lb., with a permissible load on the spring-pads of 12,000 lb. The tread is 75 in.; overall width, 89 in.; spring center (3½ in. springs), 53 in.; ground clearance at differential, 5⅝ in.; brake (dual internal expanding), 3x24 and 2½x24 in.; cast metal for wheels, 34x6 in. Solid tires are used.

The floor height of the buses is 19⅝ in. from the ground, whereas the ground clearance at differential is 5⅝ in. The New York style is 4⅞ and 5.

Receiver for R. H. Long Named in Connecticut

HARTFORD, CONN., Dec. 26—Judge William M. Maltbie of the Superior Court has named William M. Caswell of Boston temporary ancillary receiver of the R. H. Long Motors Co. of Framingham, Mass., builders of the Bay State car, with branches in Hartford, Waterbury, New Haven, Bridgeport, Danbury, New London and Stamford of this State.

The application for a receiver was made by Day, Berry & Reynolds, representing creditors of the Long company in this city and in Massachusetts.

In the application for the appointment of a receiver counsel for the creditors declared that attachments amounting to $18,500 had been placed on property belonging to the Long company in Connecticut since Oct. 20 and that other creditors were threatening to take similar action and that the assets of the company were in danger of being wasted through litigation and attachments.

It is said that the Long company has property in this State to the value of $40,000. The Butts & Ordway company of Boston joined the Connecticut creditors in asking for a receiver.

AKRON CLUB TO ERECT STATUE TO GOODYEAR

AKRON, OHIO, Dec. 26—Action has been taken by the Akron Exchange Club to erect a memorial statue here to Charles Goodyear, whose invention, the vulcanization process for rubber, made Akron the rubber manufacturing center of the world.

It is likely that the proposed statue will differ from the conventional in that it will portray Goodyear at work over his kitchen stove which resulted in his great discovery. This was in 1839 when he was experimenting with rubber and sulphur. Hearing his wife approaching and fearing a scolding for "wasting his time," he threw the rubber and sulphur into the fire. The result showed him the possibilities of vulcanization.

Citroen Representative Looking for Plant Site

PHILADELPHIA, Dec. 24 — Burnet Hershey, American representative of André Citroen, has conferred with officials of the Edward G. Budd Manufacturing Co., this city.

M. Citroen visited America about a year ago, when he was seeking a site for a factory for the manufacture of automobiles in this country. At that time he expressed himself as favorably impressed with a location in Camden, N. J., across the river.

It was stated that Hershey came here to seek a site for a proposed plant having a capacity of 250 cars a day and employing 10,000 men. The nature of his conference at the Budd plant, however, was not disclosed.

Motor Truck Producers May Meet on January 7

NEW YORK, Dec. 24—A tentative date, Monday, Jan. 7, has been set by the National Automobile Chamber of Commerce for a convention of motor truck manufacturers. The entire day will be given over to the meeting, and an interesting card has been arranged by Edward F. Loomis, secretary of the National Motor Truck Committee of the Chamber.

Among the discussions proposed are: "What Can Be Done to Improve the Standard of Truck Paper?", "Bus Operation by Electric Railway Companies," "The Pennsylvania Railroad's Experiment in Moving Freight by Motor Truck," "Progress in Building the Nation's Highways," and "Common Carrier Laws and Legislative Problems."

In addition there will be a talk on "Status of the Motor Truck Industry," illustrated with charts, by J. H. Collins of the Chilton and Class Journal companies.

Gramm All Prepared for Reorganization

Plant Sold to Committee and Present Management Will Continue Business

TOLEDO, Dec. 26—Representing the reorganization committee, E. J. Marshall has purchased the plant and business of the Gramm-Bernstein Motor Truck Co. of Lima, Ohio, from E. G. Kirby, receiver and also trust officer of the Commerce Guardian Bank.

This marks the end of the receivership, the intention being to reorganize immediately and resume operations at the Lima plant, under plans that already have been perfected. It is announced that the property will be transferred immediately to a new corporation, to be known as the Gramm-Bernstein Truck Corp., which will continue the business under the present management.

"As a part of the reorganization plan, the new company will be furnished with a very substantial amount of cash capital in addition to all of the assets of the old company, and it will start in business entirely free of indebtedness," the management announces. "Subject only to formalities of court procedure, the receivership of the old company will be closed and the new company will take over the property and start its operations on Jan. 1."

To Assume Receiver's Liabilities

Under the terms of the sale the reorganization committee is to assume the payment of the receiver's liabilities and indebtedness, while $38,193 is to be impounded and held in trust for the payment of Federal sales taxes and capital stock taxes, the funds not to be used for Federal taxes until all claims of the company or the receiver against the United States have been determined.

If the adjustment with the Government results in anything being left over in excess of the $38,193 impounded, it goes to the reorganization committee. The creditors' committee also is obligated to an amount equal to 10 per cent of the amount found by the special master to be due creditors.

Willys Corp. Wins Tax Decision for $1,500,000

NEW YORK, Dec. 24—A decision involving approximately $1,500,000, which was brought by the Government in a Federal tax suit, has been won by the Willys Corp., which is in the hands of a receiver.

Only one other important factor now standing in the way of liquidation and settlement with the Willys Corp. stockholders is a suit which was brought by the Government against the Duesenberg motor division of the Willys Corp., involving about $1,500,000. The case is pending before a special master in New Jersey, and a decision is expected soon.

Scott Succeeds Olds as President of Reo

Latter Becomes Chairman of Board, Position That Has Been Created for Him

DETROIT, Dec. 24—No change in the policies of Reo Motor Car Co. will result from the change in officers just announced, by which R. E. Olds becomes chairman of the board and R. H. Scott, president and general manager.

Olds' retirement as president is the result of a desire on his part for the last few years to be relieved of the responsibilities of this office.

The position of chairman of the board was created that he might continue actively identified with the company which he founded and at the same time give him more time for his other business enterprises.

The new president of the company joined Reo when it was formed in 1904 as superintendent. He was appointed a director in 1907 and in 1910 became vice-president. In 1915 Olds turned over to Scott the duties of general manager, which he will continue in conjunction with the presidency.

H. T. Thomas, chief engineer, becomes vice-president and chief engineer.

All other officers were re-elected, these being Don E. Bates, secretary-treasurer; R. C. Rueschaw, sales manager; H. C. Teel, factory manager; G. F. Smith, purchasing agent, and Dean M. Parsons, assistant treasurer.

Before joining Reo, Scott was superintendent of the Olds Gas Engine Co., and previous to that had been identified with the Toledo Machine Tool Co. as superintendent. Thomas first joined R. E. Olds when he headed the original Oldsmobile company in Detroit and came to Reo when formed, as chief engineer. The notable feature of the change is that it is the first important one in the Reo organization in nineteen years.

Olds Sounds Credit Warning

DETROIT, Dec. 21—A warning against too much credit in the retail end of the automobile business was sounded by R. E. Olds, president of the Reo Motor Car Co., in addressing the nineteenth annual meeting of Reo stockholders this week. He has been called a pessimist for his attitude, he said, in not countenancing the partial payment plans that some of the automobile makers in the country have adopted.

"I believe that the plan is dangerous and a menace to the business," said Olds. "I further believe that eventually this plan will prove to be bad for this country. The automobile industry has become of such tremendous importance and of such gigantic proportions that anything that affects it affects the welfare of the country as a whole."

Olds declared that the Reo Motor Car Co. will not be a party to such a plan, and that it has no finance organization to make such a plan operative.

In the absence of R. C. Rueschaw, sales manager, Clarence Triphagen, assistant, gave a short résumé of work in the sales division during the year and the outlook for 1924. Good feeling exists everywhere in the Reo sales organization over prospects, he said, and dead spots in the Northwest, Central West and South are starting to produce business. The company now has 146 distributors, 800 dealers, six factory branches in the United States, and besides its Canadian sales organization, has forty-three direct agencies in various parts of the world.

All directors of the company were re-elected for the nineteenth time.

UNDERWRITERS DEFER NEW FIRE RATE PLAN

NEW YORK, Dec. 26—Announcement is made by the National Automobile Chamber of Commerce that the National Automobile Underwriters Conference has deferred until Jan. 1, 1925, application of the proposed experience plan of grading passenger automobiles for fire rating purposes.

This means that cars will continue in the meantime to be graded under the schedule of hazards which has been operative during the past few years, and under which more than 80 per cent of the N. A. C. C. production has attained Class A, for lowest rating, by Underwriters Laboratories examination.

New Templar Executives Announced by Hausmann

CLEVELAND, Dec. 24—T. L. Hausmann, president and general manager of the Templar Motor Car Co., recently taken over by him and his associates, has completed his organization by the appointment of the following executives: Thomas O. Gibbs, president of the Acme Packing Co. and treasurer of one of the subsidiaries of the United States Steel Corp., secretary and treasurer; Frederick P. Nehrbas, formerly vice-president of the Weidely Motors Co., in charge of operations: F. L. Edman, formerly associated with the Transport Truck Co. and the Republic Motor Truck Co., advertising manager; Ralph C. Chesnutt, formerly with the Willys-Overland Co. and the Packard Motor Car Co., chief engineer, and M. C. King, formerly assistant purchasing agent of the Chandler Motor Car Co., purchasing agent. Hausmann will personally supervise sales.

TRACTORS IN PENNSYLVANIA

PHILADELPHIA, Dec. 26—More than 3000 tractors were in use on the farms of Pennsylvania during the year just closing than were reported in 1922. The number in use is estimated at 15,427.

Hennecke Appointed Moto-Meter Manager

Succeeds Harrison H. Boyce, Who Will Promote His Invention, Boyce-Ite

NEW YORK, Dec. 24—Harrison H. Boyce has retired as general manager of the Moto-Meter Co., Inc., and is succeeded by Earle V. Hennecke, who has been general sales manager for a number of years.

Boyce's retirement from active participation in Moto-Meter management will enable him to devote his attention to the promotion of Boyce-ite, the super-fuel ingredient of which he is the inventor, as he is of the Moto-Meter. He will continue his financial and general interest in the Moto-Meter Co.

George H. Townsend will continue as president of the Moto-Meter Co.

New Plant for Boyce-ite

Boyce-ite, at present, is being manufactured in a small plant in Long Island City by Boyce & Veeder, Inc., of which company Boyce is president, and Paul L. Veeder, also interested in the Moto-Meter company, is secretary and treasurer. On Jan. 15 the company will start operations in a new factory at Farmingdale, L. I., which will have a capacity of 30,000 cans an hour.

Boyce and Townsend founded the Moto-Meter Co. in 1912. With Townsend as president and Boyce as general manager, the company struggled hard in its early days to secure recognition, meeting with opposition at first from automobile clubs which claimed that the proper place for displaying their emblems was on the radiator cap. Boyce and Townsend won over the racing drivers, though, and with the approval of the heat-recording device came recognition from owners in general until now it is regarded as part of the equipment of the modern motor car.

Childs Chosen President of New Fabric Body Corp.

DETROIT, Dec. 24—Officers of the recently organized Fabric Body Corp., licensed to build fabric bodies using Meritas leather cloth, are announced as follows: President, Kenneth L. Childs, former research and development engineer of the Standard Textile Products Co. of New York; treasurer, J. H. Main, director of purchases of General Motors Corp., and secretary, Wright W. Gedge, experimental engineer of the Stearns & Foster Co.

The directorate includes the officers and the following members: Arthur D. Allen, president of the Mengel Co. of Louisville, Ky.; James B. Wilson, vice-president of the Mengel Co.; James T. Broadbent, vice-president and general manager of the Standard Textile Products Co., and L. D. Stickney, sales manager of Landers Brothers Co., Toledo.

Yellow Cab to Start Shipments to Europe

John Hertz Returns Home After Making Arrangements for Operation Abroad

CHICAGO, Dec. 26—John Hertz, head of the various Yellow Cab enterprises, on his return from Europe stated that, as a result of his trip, definite arrangements have been completed for the shipment of the first order of Yellow cabs to Europe.

He said that within ninety days he expects to have forty to fifty cabs in operation in large cities in Europe. The operation of these cabs will be largely experimental, he said, for the purpose of determining the course to be pursued hereafter in introducing the Chicago-built cab throughout Europe.

London and Paris are to be the first testing grounds in Europe for the Yellow cabs, Hertz said, but they also will be introduced in Madrid, Lisbon, Copenhagen and other large cities.

As a preliminary step operating companies were organized in Paris and London some months ago to operate Yellow cabs.

Looking over the automotive industry in Europe, Hertz found the larger French manufacturers operating at capacity with many orders awaiting delivery.

Bus Merger Started

NEW YORK, Dec. 24—Initial steps for the consolidation of motor bus corporations in New York, Chicago and St. Louis and the inauguration of uniform bus lines in all important cities of the country were taken following the return from Europe of John Hertz, head of the Yellow Cab and Chicago Motor Coach Co., interests.

A preliminary meeting was held in this city the latter part of last week, participated in by Hertz, Charles H. Sabin, chairman of the Guaranty Trust Co. of New York; Grayson M. P. Murphy, president of the Fifth Avenue Coach Co. of New York, and a representative of the St. Louis Motor Bus Co.

No statement was issued following the meeting, nor would any of the principals talk about their plans, but it is said that the proposed corporation would engage in the business of building motor buses of a uniform type, thus making it possible to interchange them between different cities should the service fail to prove to be as popular as expected in any particular place.

It also is said that this proposed expansion of city motor bus lines to all parts of the country is being planned with the full approval of the traction companies. The whole matter, however, is still in a preliminary state, but it is expected, now that the holidays are over, that another meeting will be held in New York shortly, at which further plans will be discussed.

CAR CREDITS DISTURB IMPLEMENT DEALERS

MILWAUKEE, Dec. 24 — The problem of farm implement dealers in its relation to the automobile was discussed before the annual convention of the Wisconsin Implement Association at Milwaukee by O. B. James of Richland Center, retiring president, in a way that hit at the financing methods adopted by all motor car manufacturers for the benefit of retail customers.

This credit plan, he said, makes it so easy to persuade farmers to purchase cars for other than strictly utilitarian purposes and neglect to provide themselves with improved machinery that will help him pay for luxuries in due time.

"Implements are the cheapest commodity a farmer can buy, if he will only see it," said the speaker. "A plow costs approximately 10 cents a pound, while a stove grate, the crudest of castings, costs nearly twice as much. A potato digger retails at about 10 cents a pound, while the price of a low-priced touring car is 23 cents a pound."

Chrysler Motor Files Incorporation Papers

DETROIT, Dec. 26 — Incorporation papers have been filed by the Chrysler Motor Corp. The officers are the same as those of the Maxwell Motor Corp. The new Chrysler car will be manufactured by the Chrysler organization and sold through the Maxwell sales organization with sales handled by practically all the present Maxwell dealers. Other outside dealers contracts probably will be made.

Although the new car is now in limited production prices will not be announced until the first day of the New York show. It is thought that two or three months will be required to fulfill dealers' requirements of sample cars, consequently distribution to customers will not begin until the late winter or early spring.

In addition to being exhibited at the New York show, cars will be displayed at all the principal shows.

Boston Will Sell Site to Ford for New Plant

BOSTON, Dec. 24—Mayor Curley, in a message to the Council, declares that he will recommend the sale of the city-owned Charlestown playground at Sullivan Square to the Ford Motor Co., which has offered to construct a $1,500,000 assembly and export plant.

The property consists of 793,340 sq. ft. of land and several park buildings and lies on the water front.

Big Stock Dividend Declared by Jordan

600 Per Cent Authorized by Stockholders—Common Will Total 200,000 Shares

CLEVELAND, Dec. 27—Jordan Motor Car Co. stockholders voted at their meeting here Dec. 22 to increase the common stock of the Jordan company from 12,000 shares to 200,000, to change the terms of the preferred stock and to declare a dividend of 600 per cent on the common stock.

The stockholders also authorized the offering of 42,000 shares to stockholders at $30 per share. There will be 84,000 shares of stock outstanding after the distribution is made in accordance with the stock dividend, so that each stockholder will be given the privilege of subscribing for one-half share of new stock for each share of old that is held.

The balance of 74,000 shares is to remain in the company treasury.

The refinancing is subject to the approval of the department of securities.

There have been rumors here that Jordan is to go into the manufacturing of his car, it being largely an assembled one at the present time. Another has been that the company was preparing to put on the market a smaller and lower priced car, but these rumors are declared to be without foundation.

President Edward S. Jordan stated that the proceeds of the sale of stock would be used as a backing for working capital.

La Follette Plans Bill to Cut Gasoline Prices

WASHINGTON, Dec. 26—Senator La Follette announces he is preparing a bill intended to reduce gasoline prices which will be introduced after the holiday recess.

The bill is aimed at a reorganization of the gasoline and oil industry and intended, among other things, it is said, to break the grip of Standard Oil, which the Senator maintains still exists, and to enable the Government to supervise prices and to eliminate waste.

Canada Shows Increase in Exports Last Month

TORONTO, Dec. 24—Reports show that the value of Canadian automobile exports during November was $3,064,476 as compared with $2,637,189 for the corresponding month in 1922. For the twelve months ended with November, exports were $37,467,169 against $22,465,510.

Australia was the best customer in November, taking 1314 of the 3907 passenger cars exported, valued at $440,200. It also bought 1580 trucks of a value of $360,402.

Industry Proceeding on 6 Months' Outlook

President Rutherford of M. A. M. A. Reports Conditions Following Meeting

NEW YORK, Dec. 24—Following the monthly meeting of the board of directors of the Motor and Accessory Manufacturers Association, President W. O. Rutherford declared that the industry apparently is proceeding in anticipation of reasonably steady production during the first six months of 1924. He declared there is evidence of wise management in buying with proper control of purchases and commitments.

With Henry Ford's announcement regarding the presidency, the political atmosphere has been greatly cleared, which would indicate a sound foundation for continuing good business, he declares. Financial conditions are good, he finds, and the agricultural outlook is brighter than at any time in the last five years.

"Many far-sighted manufacturers now realize the importance of extending their markets outside of the automotive industry and are cultivating diversified fields in order to safeguard their production capacity," Rutherford said. "Conditions in general are normal but justify caution and carefully based judgment. There is apparent need for continued economies, rather than increased prices as a basis for profits."

Ford Not to Make Dealer Handle Coke By-Product

DETROIT, Dec. 26—Reports that the Ford Motor Co. will require dealers to sell ammonium sulphate, a by-product of its coke plant used for fertilizer, is dismissed by factory sales officials with the statement that the company has not enough of this product to meet the farmer demand within a 300-mile radius of the factory.

Output of the River Rouge plant is approximately 24 tons daily. This is so much in demand that it is sold out always about six months in advance of production. The State of Michigan alone takes 75 to 80 per cent of it, the remainder being apportioned to branches within the factory radius. Where a supply is requested from outside territory, the company makes provision for it, but is seldom able to make a shipment within three to six months.

Because of the existing heavy demand and the limited output there is no possibility of any one being required to take any for general sale.

NETHERLANDS IMPORTS

WASHINGTON, Dec. 26—Automotive imports into the Netherlands, including trucks, passenger cars, electric vehicles, and parts totaled $15,593,260 during the first ten months of this year, compared with $15,943,350 for the same period last year, figures forwarded by the Netherlands government to the United States Bureau of Foreign and Domestic Commerce show.

The exports during the same period were valued at $5,099,337 last year and $3,389,896 the first ten months of this year. The figures furnished do not show what share of these imports were from the United States.

MEMBERS of M. A. M. A. REPORT SALES DECREASED 4.20 PER CENT DURING NOVEMBER

NEW YORK, Dec. 26—Reports from members of the Motor and Accessory Manufacturers Association show that sales in November decreased 4.20 per cent over October. Total sales amounted to $51,624,670 as compared with $53,803,350 in October.

Past due accounts showed a decrease of 13.17 per cent and notes outstanding increased 5.95 per cent.

The following table shows the sales by members of the association, the total past due accounts and notes held for all of 1922 and the first eleven months of 1923:

1922	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$17,320,000	20.61 Inc.	$4,450,000	5.45 Inc.	$3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.70 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.
October	39,753,800	3.90 Inc.	3,463,850	17.93 Dec.	2,603,100	2.09 Dec.
November	36,616,850	5.51 Dec.	4,245,850	22.58 Inc.	2,442,700	6.15 Dec.
December	34,711,630	5.20 Dec.	3,494,850	17.69 Dec.	1,905,650	21.98 Dec.
1923						
January	45,451,950	30.94 Inc.	2,469,950	29.33 Dec.	1,945,850	2.11 Inc.
February	48,518,700	6.75 Inc.	2,741,100	10.82 Inc.	1,981,950	1.86 Inc.
March	59,428,800	22.49 Inc.	2,129,350	22.32 Dec.	1,929,300	2.66 Dec.
April	61,647,050	4.00 Inc.	3,313,150	8.05 Inc.	1,839,350	5.00 Dec.
May	58,409,550	5.25 Dec.	1,982,750	14.28 Dec.	1,140,150	38.00 Dec.
June	58,067,500	.059 Dec.	2,191,150	10.55 Inc.	1,111,970	2.47 Inc.
July	48,536,700	16.40 Dec.	2,313,400	5 60 Inc.	1,424,450	28.10 Inc.
August	50,264,100	3.50 Inc.	2,382,370	7.00 Inc.	1,132,250	20.00 Dec.
September	46,222,650	8.04 Dec.	3,583,000	50.39 Inc.	1,322,550	16.80 Inc.
October	53,803,350	16.50 Inc.	2,857,450	20.00 Dec.	1,094,500	17.00 Dec.
November	51,634,670	4.20 Dec.	2,524,850	13.17 Dec.	1,163,800	5.95 Inc.

Clothiers Complain Public Places Its Money in Cars

CHICAGO, Dec. 26—The public today buys automobiles before clothing, is the complaint of the National Association of Retail Clothiers, which recently made a survey to determine what the farmers have done with the money received from their crops.

It was found that in one part of Texas where an unusually large cotton crop was harvested at the highest price in years 1000 new automobiles were sold while suits and overcoats remained on the shelves. In one section of Iowa, 850 veterans used their State bonuses to pay for automobiles and so far as could be learned not one of them bought a new suit.

A store in New York State which usually sells 150 suits and overcoats in the pre-Christmas season disposed of only seventeen, while a store across the street sold twenty-five automobiles.

As a result, clothing manufacturers in Chicago report large surplus stocks this year.

Tax Repeal Message Broadcast by Clancy

WASHINGTON, Dec. 24—Why the excise tax on automobiles, trucks, accessories and tires should be repealed was the subject of a message broadcast by Congressman Robert H. Clancy, author of the three measures introduced in the House of Representatives.

The radio message was directed to the automobile user and explained just what the 5 per cent tax means to the ultimate consumer. Arrangements for the broadcasting were perfected under the auspices of the A. A. A. and was heard by more than 100,000 "listeners-in," it was estimated.

In his message Clancy said that every automobile user in the country should write his Senator and Representative, demanding that they vote and work for the repeal of the automotive excise taxes, which he declared were "manifestly unfair, unwise and unnecessary."

The repeal would mean a saving of 3 per cent to the present car owners in the country in their repairs, tires and accessories, and 5 per cent to them in their replacement purchases of new equipment, he said.

Figures were cited showing that, while the automobile user paid during the last fiscal year, ending June 30, 1923, a total of $146,000,000 in taxes, but $72,000,000 was expended by the Federal Government in the interest of the automobile using public.

Ford's Methods Allow Bigger Lumber Output

Activities at Iron Mountain Increase—Body Factories on Production Basis

DETROIT, Dec. 26—Methods employed by Ford Motor Co. in its lumber operations in northern Michigan have made possible economical production of 150,000,000 board feet this year from tracts formerly considered too far from the mills for profitable operation, the company declares. Development of storage facilities have made it possible to haul most of the timber during the winter when sleds can be employed.

Production schedules at the L'Anse and the Pequaming mills call for 3,000,000 board feet a month, and the Iron Mountain mills are turning out 9,000,000 feet a month. The company is building at Iron Mountain a new charcoal retort costing $3,000,000, in which waste wood and possibly slashings from the logging areas will be distilled in large ovens by a recently perfected process.

Charcoal for charcoal iron, wood alcohol, ethyl acetate for artificial leather production and other by-products will result. The new process distills the wood by the heat of its own combustion.

The new body factories at Iron Mountain were started on a production basis this month, making sedan floor boards. Eventually all the woodwork for the sedan body will be completed here and the parts shipped to body assembly plants. Of the lumber sawed in the three Ford mills, 80 per cent is hardwood.

Daily production of coal from the four Ford mines in the West Virginia and Kentucky fields is about 13,000 tons a day. A reserve of 400,000 tons has been accumulated at the River Rouge plant, and this storage capacity will be increased to 1,000,000 tons to provide for lake shipments. Coal car shortage has been relieved by adding 1000 new cars to the equipment at the mines.

Trustees to Untangle Monroe Body Affairs

LUDINGTON, MICH., Dec. 26—A bankruptcy hearing held in connection with the Monroe Automobile Body Co., which failed with liabilities of $104,000, has been adjourned indefinitely by Referee Benn M. Corwin.

Carl L. Ashbacker, Ludington merchant, and Michael B. Danahier, wealthy Ludington resident, were appointed joint trustees in bankruptcy and will attempt to straighten out the tangled affairs of the company. The chief assets are the factory site, part of which was bought from the company by the city which turned over $100,000 in bonds issued originally for harbor improvements, and the plant.

Among those examined at the hearing were Robert F. Monroe, owner of 1228 shares in the company and formerly in control of its affairs, who is himself a claimant against it for $41,293; Robert F. Dowland, appointed receiver last fall, and William L. Hammond, one of a number of claimants. No claim has been filed thus far by the city of Ludington, but the city still has time to take that step. It was asserted the town would become a preferred creditor, should this action result.

Ernest H. Smith Named A. A. A. General Manager

WASHINGTON, Dec. 24—The newly created position of general manager of the American Automobile Association has been filled by the appointment of Ernest H. Smith by President Thomas P. Henry. Smith comes from the United States Chamber of Commerce, leaving the post of chief of the campaign department, which he created three years ago. Previous to that he was executive secretary of the Indianapolis Chamber of Commerce.

This appointment marks the first step in a new program of development for the A. A. A. The organization is to be enlarged, new departments will be created, additional services to motorists are to be rendered, and an aggressive membership campaign started, Henry declares.

Making of Straight Side Rims Started in France

PARIS, Dec. 15 (*by mail*)—Straight side rims are now being manufactured in France under Goodyear license by the Manufacture Française des Jantes Metalliques, with a factory in Paris. The importance of this lies in the fact that up to the present French automobile construction has been 100 per cent on clincher bead tires.

While not yet very strong, there is now a sufficient demand for straight sides to justify the opening of works in this country.

Italy, which has been closely identified with clincher bead tires, is now building straight side rims in the Erlott factory at Milan. Construction is under Goodyear license.

Plant of Perfection Tire May Reopen Following Sale

FORT MADISON, IOWA, Dec. 22—Receivers' sale of the Perfection Tire & Rubber Co., set this week by P. S. Junkin, receiver, for Jan. 28, will open way for the re-establishment of the concern, organized a year ago.

The plant was built at a cost of $5,000,000, but was forced into bankruptcy when claims of more than $2,000,000 were pressed against it. It is believed that prominent rubber and tire industries will buy the plant outright, liquidate its indebtedness and reopen its factories. Twenty-three residences and 200 acres of land are included in the plant inventory.

Would Protect Notes of Kentucky Wagon

Noteholder Files Suit for Deposit of $250,000 National Motors Bonds

LOUISVILLE, KY., Dec. 21—A suit to require the National Bank of Kentucky to deposit with the receiver of the Circuit Court $250,000 in bonds of the National Motors Co. for the protection of the holders of 282 promissory notes against the Kentucky Wagon Manufacturing Co., was filed in the Circuit Court yesterday by May S. Williams, holder of the notes.

It is alleged that, because of a merger of the wagon manufacturing company with the motors company, the assets of the wagon concern are no longer available to liquidate the notes. These notes aggregate $282,000 and bear 8 per cent interest. The suit is filed in the interest of the claims of all the note holders, who would be adjudged owners of the bonds.

The suit is directed against the motors company, the wagon company and the bank, which holds the bonds.

The petition alleges that the notes were issued April 1, 1921, under the provision that no mortgage or lien for any liability would be issued by the Kentucky Wagon Manufacturing Co., and that the notes should have precedence so long as any amount of the series was outstanding. It is charged that this provision of the contract was the chief inducement for the purchase of the notes.

It is further alleged that the National Motors Co., a Delaware corporation, Aug. 7, 1922, by conveyance acquired the properties of the Kentucky Wagon Manufacturing Co. in Jefferson County, and that the corporation has at no time paid anything of value for the transfer of the property.

Mortgage Put on Property

The petitioner also states that the National Motors Co. knew the provisions of the promissory notes and that July 1, 1922, it executed to the Union Trust Co. of Chicago and H. A. Wheeler a deed of trust or mortgage by which the corporation assumed to mortgage the property transferred by the Kentucky Wagon Co. for $6,000,000.

In order to protect the rights of the holders of the 282 notes, petition alleges, the National Motors Co. deposited with the bank here $250,000 of the bonds executed by the corporation. However, it is declared that these bonds have been sold in excess of a fair market value of the property conveyed, and that the rights of the holders of the notes cannot now be enforced against the property of the Kentucky Wagon Manufacturing Co. The petitioner states that the bonds are not worth in excess of $282,000, and that the holders of the notes would not realize the amounts due them when bonds were distributed proportionately.

3,500,000 Estimated As Output Next Year

Majority of M. A. M. A. Members Cite That Figure in Answering Questionnaire

NEW YORK, Dec. 24—Consensus among the members of the Motor and Accessories Manufacturers Association who replied to a questionnaire sent out by General Manager M. L. Heminway places 1924 production of cars and trucks at approximately 3,500,000.

The replies show wide divergence. Less than 5 per cent hold out hope for a production in excess of 4,000,000, the 1923 total; about 20 per cent look forward to a maintenance of that production for the year, while another 20 per cent expect a drop to approximately 3,000,000. The majority named 3,500,000.

This is the answer to Question No. 1, asking for a production estimate of the seven asked by Heminway in his annual survey of the situation in the parts and equipment field.

Other Questions Asked

The other six questions are:

What in your opinion is the automotive outlook for 1924 with respect to (a) finance and credit? (b) sales and market?

What new tendencies in passenger car and truck construction and design will be featured at the automobile shows?

What are the significant new developments in automotive units, accessories and equipment?

What are the most vital problems at the present moment for: (a) the automotive industry as a whole? (b) the parts and accessory manufacturers?

What in your opinion is the foreign trade outlook for the automotive industry?

What in your opinion is the paramount lesson learned by the automobile industry in 1923?

Summaries of the answers to Questions Nos. 1 and 2 have been made and announced; the others will be made public before the show.

Opinions on the outlook for 1924 in the matter of finance and credit and sales and market show that fundamental credit conditions are believed to be sound; that there will be aggressive, competitive warfare among the larger units in the industry, and that the smaller manufacturer will feel this competition unless he has an exceptional article, a strong sales plan and well selected dealers selling his car on merit rather than price. Most of those who replied to this question are of the belief that the strong companies will have a good year. The used car problem, if it becomes acute, as some think it will, is likely to complicate the situation.

450 BUSES IN NEWARK, N. J.

NEWARK, N. J., Dec. 24—It is estimated by Joseph Crawford, supervisor of transportation, that Newark buses will have carried 100,000,000 passengers this year by the end of the month. Up to Nov. 30 the count was 88,650,000, which was 11,000,000 more than the total for last year. For two months this year there was a trolley strike, which partially explains the increase. There are now 450 buses operating in Newark, those brought over for the strike having been discontinued.

Production in November Reaches Total of 312,594

WASHINGTON, Dec. 24—A total of 186 manufacturing concerns were engaged in the construction of automobiles and trucks in this country on Dec. 1, according to a census report just completed by the United States Census Bureau.

Of this number 96 companies manufactured passenger cars and 119 made trucks, 29 making both passenger cars and trucks. Since the first of the year twelve concerns either went out of business entirely or were absorbed by other automobile manufacturing concerns.

Production figures, with comparisons, while not complete for the first six months of 1921, are as follows:

PASSENGER CARS			
	1921	1922	1923
January	.....	81,696	223,819
February	.....	109,171	254,773
March	.....	152,962	319,770
April	.....	197,224	344,639
May	.....	232,462	350,410
June	.....	263,053	337,362
July	165,616	225,086	297,330
August	166,756	249,492	314,373
September	144,670	187,694	298,911
October	134,774	217,566	335,023
November	106,081	215,352	284,680
December	70,727	208,010	.....

*TRUCKS			
	1921	1922	1923
January	.....	9,576	19,720
February	.....	13,350	22,161
March	.....	20,022	35,260
April	.....	22,640	38,056
May	.....	24,097	43,678
June	.....	26,298	41,145
July	11,136	22,046	30,663
August	13,400	24,692	30,829
September	13,978	19,462	28,638
October	13,149	21.795	30,166
November	10,487	21,949	27,914
December	8,656	20,354	.....

* Figures on truck production also include fire apparatus and street sweepers.

Ansaldo's Turin Works Purchased by Fiat Co.

PARIS, Dec. 15 (*by mail*)—At a reported purchase price of 18,000,000 liras, the Turin works of the Ensaldo San Giorgio Shipbuilding Co. have passed into the hands of the Fiat Automobile Co. and will in future be known as the Fiat Stabilimento Grandi Motori.

Financial losses since the war have caused a complete reorganization of the Ansaldo company, including a reduction of capital from 100,000,000 liras to 5,000,000 liras.

It is as part of this plan that the stationary and marine engine works at Turin, which originally were owned by a branch of the Fiat company, were resold to that concern.

1,000,000 Driveaways Were Made This Year

Traffic Managers Also Hear of Large Shipments Made by Railroads and Boat

DETROIT, Dec. 21—Railroads of the United States in the year closing will have handled 540,000 carloads of assembled automobiles and 210,000 carloads of parts and tires, J. S. Marvin, general traffic manager of the National Automobile Chamber of Commerce, said in opening the conference of freight traffic managers of the industry here this week. The railroad revenue on this traffic is estimated at $200,000,000.

More than one million motor vehicles were driven over the highways to destination by dealers, and 80,000 shipped by boat.

The conference had under discussion procedure that would facilitate handling of the vast traffic of the industry by the railroads, including freight car supply and rates.

Deep interest was displayed in the general reorganization of freight rates structure which President Coolidge in his message said should be ordered at once by Congress. No recommendations were undertaken pending further facts on which the reorganization is to be based.

Nothwithstanding the great increase in this traffic, reports indicated that railroads this year have maintained a more adequate supply of freight cars at the factories than ever before.

Car and truck manufacturers represented by traffic managers at the meeting were Hupp, Studebaker, Gray, Lincoln, Paige, Hudson, Cadillac, Chevrolet, Dodge Brothers, Rickenbacker, Packard, Standard, GMC truck, Oakland, Olds, Reo, Durant, Buick, White, Jordan, Cleveland, Pierce-Arrow, Auburn, Overland, Yellow Cab, Haynes, Nash, American-LaFrance, Columbia, Maxwell and Chalmers.

Tire Builders in Akron Launch Economy Program

AKRON, OHIO, Dec. 26—Further reductions in wages in some departments of the Miller Rubber Co. have resulted in a strike on the part of calendar men, which, according to company officials, will not materially interfere with the operation of the plant.

The strikers will be given a chance to return to work or be considered discharged, official announcement by the company says.

Reductions in wages amounting to about 10 per cent have been accepted by the tire builders and finishers of the Goodyear Tire & Rubber Co.

The reductions are part of a more or less general program to decrease production costs. Reductions in selling costs are part of the economy program of 1924.

Men of the Industry and What They Are Doing

Dorman Joins Mooney Staff

Sherman W. Dorman, vice-president and general manager of the Overseas Motor Service Corp., has severed his connection with that corporation and joined the staff of J. D. Mooney, vice-president of the General Motors Corp., in charge of export operations and president of the General Motors Export Co. M. P. Nolan, who has been technical manager of the Overseas company, has been appointed general manager, succeeding Dorman. The change becomes effective Jan. 1. The company handles the export sales of the various G. M. C. equipment and accessory lines, as well as other products of a similar character.

Auburn Advances Faulkner

Roy Faulkner has been advanced from the position of sales manager of the Auburn Automobile Co. to director of sales, the chair left vacant through the election of J. I. Farley to the presidency last August. E. H. Gilcrest, formerly vice-president and director of sales of the Westcott Motor Car Co., has been named sales manager, succeeding Faulkner. Roy A. Sears, formerly advertising manager of the R&V Motor Co., has been appointed Auburn advertising manager.

Changes With Delco

O. L. Harrison has been elected vice-president and acting general manager of the Dayton Engineering Laboratories Co., of which C. F. Kettering is president. W. A. Chryst has been made vice-president in charge of engineering and D. K. Baker, resident comptroller, assistant treasurer and assistant secretary.

Here from Melbourne

Harry G. Farr, representative of an automobile distributing syndicate in Melbourne, Australia, is in the United States to attend the New York and Chicago shows and visit manufacturers with a view to making a distribution connection. He will be at the Biltmore Hotel in New York during the national show there.

Federal Steel Appoints Burnett

Fred C. Burnett, fromerly sales manager of the C. N. & F. W. Jonas Co.'s automotive parts sales organization of Chicago, has been appointed sales manager of the jobbing division of the Federal Pressed Steel Co. of Milwaukee, with headquarters at 1202 London Guarantee & Accident Building, Chicago.

John H. Earle Joins Fuller & Sons

John H. Earle, formerly sales manager for the Huck Axle Corp. of Chicago, has severed his connection with that concern to become eastern sales manager for Fuller & Sons Manufacturing Co. of Kalamazoo.

Lytle Becomes Service Manager

R. W. Lytle has been appointed service engineer of the Formica Insulation Co. of Cincinnati to assist manufacturing customers using its timing gear blanks.

Rickenbacker Announces Prices of 1924 Models

DETROIT, Dec. 27—The Rickenbacker Motor Car Co. has announced the prices of its 1924 models. Four wheel brakes will now be fitted as standard equipment on all models.

The following table shows the old and new prices:

	Old	New
Sport roadster.....	$1,685	$1,645
Sport phaeton.....	1,635	1,595
4-Passenger coupe.....	1,885	2,035
5-Passenger sedan.....	1,985	2,135

Packard Nets $1,250,000 Available for Dividends

DETROIT, Dec. 26—Curtailed factory operations in connection with preparations for the advent of its 1924 six-cylinder line is said to be the cause of Packard Motor Car Co.'s net earnings in the first three months of its fiscal year beginning Sept. 1 being somewhat lower than at the corresponding period in 1922. The net for dividends in September, October and November were approximately $1,250,000, compared with $2,553,164 in the same period of 1922.

Quarterly net for the company's 1922 to 1923 fiscal year averaged $1,750,000. The balance in the first quarter of the current year, which equals, after preferred dividends, more than 40 cents a share on the 2,377,000 shares of $10 par common, compares favorably with the average last year.

Gardner Reduces Prices of Open Cars $60 to $100

ST. LOUIS, MO., Dec. 24—Effective Jan. 1 the Gardner Motor Co. announces reductions in price on all open models, the cuts ranging from $60 to $100.

The following schedule shows the old and new prices:

	OLD	NEW
Roadster	$ 995	$ 895
Phaeton	995	895
Radio phaeton.....	1,155	1,095
All Season phaeton...	1,095	995

DODGE LEASES ONTARIO PLANT

DETROIT, Dec. 26—Dodge Brothers has leased the plant of the Walker Twist Drill & Tool Co. at Walkerville, Ont., it is reported, and will move the Windsor plant to the new quarters.

Rubber Makers Plan Meeting and Banquet

Feature of Former Will Be Discussions of Problems by Leaders in Industry

NEW YORK, Dec. 26—The annual meeting of the Rubber Association of America will be held Monday afternoon, Jan. 7, at the Waldorf-Astoria, followed by the annual banquet in the evening. The meeting will elect seven directors who in turn will select the officers for the following year.

An innovation this time will be brief talks by leaders of the industry on present conditions in the rubber trade, which will be followed by discussions by the members.

President W. O. Rutherford will act as toastmaster at the banquet in the evening, the principal speaker being W. E. Burton of Ohio, who will talk on economics.

The directors of the Rubber Association have paid heed to the request of the National Tire Dealers Association, voiced at the latter's recent annual meeting, and will appoint a sub-committee which will discuss pertinent questions with the dealers.

R. H. Collins Resigns Peerless Presidency

(*Continued from page* 1322)

Then it commenced to slide under heavy offerings. That continued for months.

Some weeks ago David Rockwell, who has been in the investment business, filed suits against Collins. Rockwell claimed to be a minority stockholder and that he was acting in the interest of stockholders, claiming that domination of the board of directors rested absolutely with Collins. He attacked a contract between Collins and the company in which Collins was to receive a bonus of $65 on each car manufactured.

After these suits were filed the Collins regime was upheld at a stockholders' meeting, and then Collins offered to resign. He was continued in office. Some weeks ago the Rockwell suits were settled by Collins paying back to Peerless $150,000. Collins did not accept all of the salary due him on his contract with Peerless.

FLINT PHAETON NOW $1,295

NEW YORK, Dec. 24—After a conference with the dealer organization, Durant Motors, Inc., has increased the price of the Flint $100. This advances the list on the phaeton from $1,195 to $1,295, other models also being advanced.

Road Work Cost Low with 5-Ton Trucks

Economical Value Over 3-Tonners Shown in Tests Made by County in New York

SYRACUSE, N. Y., Dec. 26—Figures showing the actual cost of maintenance of highway department trucks have been prepared by Raymond B. Traver, county superintendent of highways. The figures tend to show that in a fleet of thirty-five trucks of all descriptions used in highway work the most economical trucks are five-tonners. The figures show further that the trucks donated by the Government to various highway departments are uneconomical to operate.

The result of the survey of maintenance costs will be that hereafter equipment will be standardized in the county highway department on a five-ton truck basis, except for a few three-quarter-ton trucks which are essential for light work.

The figures show that the average cost of a five-ton truck per day was $13.88; that the average cost of a five-ton truck for each ton carried was $0.63½, and that the cost per mile for five-ton trucks was $0.266.

Compared with 3-Ton

This compares with three-ton trucks as follows: cost per day, $20.40; cost per ton carried, $1.39, and cost per mile, $0.556. Flat trucks: cost per day, $12.83, and cost per mile, $0.395. Express trucks: cost per day, $9.02, and cost per mile, $0.324.

In figuring the schedule of costs the total days' operation, cost of gasoline, miles traveled, oil, grease, incidentals, repairs, total operating cost for season, insurance and drivers' salaries were figured. An individual record of each truck in the department was kept and a very accurate system of costs determined. The county is beginning to standardize its equipment and expects in this way to reduce the costs.

The trucks included in the tabulations were those actually used in the construction and maintenance of roads. The county's highway department is one of the largest in the State and the equipment is estimated to be worth approximately $1,000,000.

Story of Road Building to Be Pictured at Shows

WASHINGTON, Dec. 26—The Federal Government's past, present and future program of highway construction will be one of the major exhibits at the Chicago Good Roads Show to be held on Jan. 14 to 18, the United States Bureau of Public Roads announces.

The exhibit, in seven parts, sets forth the story of good roads, what they mean to the country and the progress being made in their construction. The exhibit consists of the following:

(1) The composition model and painting exhibited at the International Exposition in South America, showing construction of gravel road.
(2) Paintings showing Federal and forest road construction in all sections of the country.
(3) A small booth illustrating various activities in the bureau relating to physical research in road building.
(4) Small road models illustrating methods of construction.
(5) Motion pictures illustrating road construction.
(6) An enlarged map showing Federal roads now completed, under construction and to be constructed.
(7) A large model and painting showing the services that a road performs in the city, suburbs, and country, and what good roads mean to the city, suburb and country.

New 6-Cylinder Phaeton and Sedan Made by Velie

MOLINE, ILL., Dec. 24—A new six-cylinder car with 118 in. wheelbase and listing at $1,095 for the phaeton will be exhibited at the New York and Chicago automobile shows by the Velie Motors Corp.

The sedan model, also on 118 in. wheelbase, lists at $1,545.

In addition to these two models the company announces that there will be a line of de luxe models at somewhat higher prices, which will be equipped with four-wheel brakes and balloon tires.

These new models will use the Velie engine which was used in the 1923 Velie models, having a pressure lubricating system.

Baked enamel finish will be used on these new cars. The bodies are mounted low, semi-elliptic, underslung springs being used. Graceful appearance, perfect chassis balance and spacious room for the passengers are special characteristics claimed for the new models.

$9,000,000 Gross Sales Shown by General Tire

AKRON, Dec. 26—The General Tire & Rubber Co. in its annual statement shows gross sales of $9,000,000 and net profit of $1,200,000 as compared with sales during 1922 of $7,600,000 and net profit during the same year of $1,060,000.

Unit production during the year was 51 per cent greater than last year.

Net profits amount to $30 a share on present stock following a stock dividend of 100 per cent last year and reduction to $50 par which amounts to $120 a share on the common on the old basis as compared with $100 a share on the common shown in 1922.

TUSCORA RUBBER BANKRUPT

CLEVELAND, Dec. 26—The Tuscora Rubber Co. of New Philadelphia, Ohio, has been adjudged bankrupt by the Federal referee in bankruptcy. Willis Bacon of Akron has been appointed trustee by the creditors, whose claims are said to aggregate $205,000.

Speedway in France Will Open Next July

First Event on Track Now Building Will Be Free-for-All 500-Mile Race

PARIS, Dec. 15 (*by mail*)—A free-for-all 500-mile race will mark the opening of the first French automobile speedway, now under construction near Marseilles. Paul Bablot, ex-race driver, who is at the head of the organization, is of the opinion that for a long-distance event there is no need for weight, piston displacement or other restrictive rules, and in consequence he has announced the opening track race, for which the date of July 13 has been accorded by the international racing authorities, free to all types of cars, with either one or two men aboard, and with two assistants allowed at the pits.

Entry fees will be refunded to all starters, the winner will receive 100,000 francs cash, the second man 50,000, and the third man home 20,000. In addition, there will be a cash prize of 5000 francs for the leader at each 100 kilometres, and if the world's record for 500 miles is beaten, the winner will get an additional 20.000 francs. This record at present stands at 94.48 m.p.h.

Production This Year May Total 4,000,000

(*Continued from page* 1322)

The growth of motor buses as a medium of transportation has been an important factor in keeping up schedules in truck producing plants and will continue to play a leading part in subsequent activities. Truck output has kept even for a number of months. Some improvement is expected to come with the turning of the new year and a gradual advance through the remainder of the winter and well into spring is now looked for. Next year, from present indications, should see this branch of the industry operating on a more normal basis than in the past.

Pierce-Arrow Not Decided on Rumored Light Six Car

BUFFALO, Dec. 24—Regarding the rumors that the Pierce-Arrow Motor Car Co. is contemplating bringing out a lower priced light six, President Myron E. Forbes declares that at present the company is not in a position to make a definite announcement regarding its policy in the matter, but that if a light six is put on the market it will in no way affect the present Pierce-Arrow car.

His engineers have been studying the production of a light six, he says, just as they review all tendencies on contemporaneous motor car production.

Shorter Time Taken for Parts Inventory

Orders for Deliveries to Motor Vehicle Builders Call for Full Output Schedule

MILWAUKEE, Dec. 24—While some shops engaged in the manufacture of units, parts and equipment close down Saturday night until Jan. 2 for the holiday vacation and inventories, the majority of plants are reducing the ordinary vacation or holiday recess to the first two days of this week and next, because specifications on contracts and orders call for deliveries that require as full a production schedule as possible.

The situation in this respect is not much different from a year ago, when the holiday recess in most works was limited to the two holidays. The extra day being granted this year is due to the feasible position of the holidays, as they fall on Tuesday.

On the whole the activity of the automotive unit and parts industry at this time is comparable to that of a year ago. There is absent, however, the rather feverish insistence of manufacturers that deliveries be speeded up to the last notch, as a year ago. Car and truck builders are adhering close to delivery specifications without rushing factories. Deferment of deliveries and cancellations of any part of original orders are almost an unknown quantity, and the state of the industry is regarded as substantial and healthy, with prospects for the first three to six months of 1924 equally so.

Official reports concerning employment comment on the fact that the favorable position of automotive industries has held the number of men at work in all industries at close to the average for the entire year, despite the fact that the slowing down of iron, steel and machinery works since the middle of November, due to the smaller demands for goods apart from the automotive lines, has caused a decline in the employment figure.

Good New Year Forecast in Hoover's Greetings

WASHINGTON, Dec. 26—The twelve-month period now ending has been a prosperous one for the automotive industry, and 1924 bears promise of being a "Happy and Prosperous New Year," says a statement issued this week by Secretary of Commerce Hoover, outlining the past year's accomplishment in the automotive industry and wishing the industry "Best wishes for the New Year to come."

Foreign shipments of all automotive products in 1923, judged on the basis of the most recent figures, have been almost double those of 1922, which in turn were approximately 100 per cent more than those of 1921, the secretary reports.

The value of all automotive exports, including parts and accessories, in the first ten months of 1923 was $135,509,159, as compared with $80,506,232 in the corresponding period of 1922. The total number of cars and trucks exported in the ten months in 1923 was 125,786, compared with 63,645 in ten months in 1922.

Production also advanced far beyond expectations, increasing from 2,120,384 passenger cars and trucks in the first ten months of 1922, to 3,396,638 in the corresponding period of 1923.

The total output of the present year will probably exceed 4,000,000. "Affording a sure basis of optimism for the future, these figures are in themselves a promise for a 'Happy and Prosperous New Year,'" the New Year's survey predicts.

Weymann Body Orders Follow French Show

PARIS, Dec. 17 (*by mail*)—Since the closing of the Paris show orders for 300 custom bodies have been received by the C. T. Weymann Co., builder of the lightweight fabric leather body which was one of the outstanding features of the French exhibition.

New shops are being erected, and every effort is being made to increase the present production, which is seventy per month, in order to catch up with demand. Despite this, the firm has about 100 chassis of various makes waiting to go into the body shops.

This type of body appears to have definitely secured public favor in France. Recently important improvements have been made in the use of rounded panels by which the angularity, which was one of the objections to this construction, has been entirely eliminated. Licenses for the Weymann construction have been granted to seven firms in England, to one in Italy and to once in France. A Weymann body has just been shipped to the Fisher Body Corp. of Detroit.

$44,862,743 Net Sales Shown by Fisk Rubber

NEW YORK, Dec. 24—The balance sheet of the Fisk Rubber Co. for the ten months ending Oct. 31, which now is the end of the company's fiscal year, shows net sales of $44,862,743, with operating profits after depreciation but before interest of $3,810,881.

After interest and other charges of $2,583,613 and setting aside $500,000 for contingent liabilities prior to 1923, the sum of $2,083,613 is carried to surplus. This compares with a corresponding period in 1922, with net sales of $38,516,611, showing an increase of 16.5 per cent and an increase in operating profits of $1,179,998, or 44 per cent.

The balance sheet shows current assets of $23,108,455 and current liabilities of $3,607,560, a ratio of current assets to current liabilities of 6.4 to 1. Inventories are priced at cost or market, which ever is lower, and the cash position materially improved with cash on hand more than sufficient to liquidate all loans payable.

Keener Competition Predicted by Hardy

Successful Operation, He Says, Will Resolve Itself into Question of Economics

DETROIT, Dec. 24—Present competition in the automotive industry will become keener as the year 1924 progresses, A. B. C. Hardy, president of the Olds Motor Works, told distributor service managers at a factory meeting here. As a result of this, he said, the automobile buying public will receive greater dollar for dollar value than they have ever received before.

The entire condition will resolve itself into a question of economics, he declared. The company which can maintain production and eliminate every unnecessary cost, no matter how small, will be the one that will weather the storm. He cited the changes that have been made in the Olds factories to prepare for the competitive era, and said that, although the cost was more than $2,000,000, it was necessary that manufacturing costs might be reduced.

B. C. Koether, director of the sales, service and advertising section of the General Motors advisory board, told of what General Motors has done and is doing to reduce the cost of producing automobiles. Through standardization the number of different small parts used in General Motors cars has been reduced during the past few years from 13,000 to 2000. This means a saving of many dollars, he said, which has been passed on to purchasers.

Ford Is Completing Plans for New Buffalo Factory

BUFFALO, Dec. 26—Final arrangements are now being made for the acquisition by the Ford Motor Co. of the Pratt estate along the River Road as the site for the new local assembly plant, to be constructed at a cost of $5,000,000.

The Pratt estate is between the barge canal and the river, running north from Hertel Avenue and with riparian rights included. It has a river frontage and is accessible to Niagara Street by Hertel Avenue, by a foot-bridge at Hertel Avenue and the Erie Railroad bridge nearby.

The water depth ranges from 20 to 25 ft. The property is served by the Erie Railroad, which also controls the right of way across the property immediately south of the estate. The ship canal gives docking facilities without current.

The assessed valuation of the property is $242,000. The deal when consummated, however, will call for a price of $400,000, or $20,000 an acre.

Plans are now being drawn for the construction of the new five-story plant. The present plant is now assembling 300 cars a day and employs 600 men. The new building will turn out 1000 cars and employ 2000 workmen.

Sales in California May Mount to 250,000

Steady Sales Reported in December Promise High Total for Full Year of 1923

OAKLAND, CAL., Dec. 26—Sales of automotive vehicles for November, 1923, were more than 25 per cent greater than in November, 1922, in California, according to figures compiled by Motor Registration News, statistical journal printed here. December sales, according to this publication, are gaining over those of the same month last year. Passenger car and truck sales totaled 21,410 in California for November, 1923, a gain of 4045 over the sales of November, 1922.

If sales continue for the remainder of December as they have for the first three weeks of that month, the statistical publication estimates that the total sales for the year 1923 will pass the 250,000 mark.

Passenger cars to the number of 19,447 were sold in California in November, 1923, as compared with 15,604 in the same month last year, a gain of 24 per cent. Truck sales for November, 1923, were 1933, against 1761 in the same month one year ago, a gain of 9 per cent.

No Surplus of Cars

The demand for cars throughout the State, averaged for every month in the year, shows that there never has been a surplus, and that, for the greater part of the year, the dealers throughout California never were able to obtain all the cars they could have sold. Many dealers have made trips to the factories in an effort to get more cars, and thousands of dollars have been spent for telegrams urging larger and faster deliveries.

November figures have greatly encouraged the dealers in California, and there is a prevalent belief that the opening of the coming year will see an increase in sales over any preceding January, and probably over any month of 1923. One of the heaviest months of the first half of 1924 probably will be March, since many buyers are openly holding off the purchase of a car until after "assessment day," or are putting in orders now for March and April delivery.

The demand for good used cars, or for cars which have been reconditioned by the dealers in that kind of car, continues strong, while recent price cuts in some of the makes, notably the Essex, have stimulated buying to a great extent. The new models of the Star have added impetus to sales of that car, while improvements in the Chevrolet, particularly the sedan models, have put it in a place in point of sales second only to the Ford in California.

NATIONAL TIRE ELECTION

EAST PALESTINE, OHIO, Dec. 24—The annual meeting of stockholders of the National Tire & Rubber Co. re-elected the following officers: President, C. L. Merwin; vice-president and general manager, C. E. Miley; treasurer, C. W. Helman, and secretary, L. M. Kyes. The company's statement shows an increase in sales of $500,000, with net profit from operations of $112,000. Current assets of $476,192, and current liabilities of $163,553 are listed.

McNaughton Reports on Middle West Outlook

DETROIT, Dec. 26—Following a trip through the Middle Western States, Lynn McNaughton, vice-president and sales manager of the Cadillac Motor Car Co., reports conditions favorable for continued substantial business. Before the end of the year much of the money now tied up in this year's crop will be released, he said, and rate of purchase will increase and probably will be on a higher level during 1924.

Citing Minnesota, McNaughton said a detailed study of the agricultural situation for 1923 shows marked improvement over 1922, even though wheat, because of large production, is low. The farm value of all crops in that State for the year is $154,000,000 more than in 1922, he said. That is an increase of 89 per cent, which is significant in that 47 per cent of the purchasing power of the State is dependent on agriculture.

Minnesota's manufacturers are operating at capacity, he said, and 31 per cent of the purchasing power of the State depends upon its industries. Bank clearings show an increase of 5 per cent over 1922. Purchases show an increase of 10 per cent over last year in Minneapolis, and 8 per cent for the whole State. There are spots where conditions are unfavorable but the figures for the whole State reflect prosperity.

Seville, Spain, Prefers Cars of American Make

WASHINGTON, Dec. 24—A decided preference for American made automobiles is reported in the Province of Seville, Spain, the third largest automobile using province in the kingdom, according to a report just made to the United States Bureau of Foreign and Domestic Commerce by the American consul there.

Import figures show that 725 cars were imported during the first ten months of this year, of which 663 were of American make and sixty-two of European. In the province of Cordoba during the same period 301 cars were imported, of which 270 were American make and thirty-one European.

The American car is popular, the report states, despite the fact that the odds are all in favor of the European made car, which has the advantage of lower freight rates, preferred tariffs and the sentiment and affiliation of the Spanish people for European goods. Another development of the 1923 motor car market is the almost complete disappearance of German made cars.

November Sales Fell in Mid West States

Loss of Approximately 50 Per Cent Registered in Illinois and Indiana

CHICAGO, Dec. 26—Approximately a 50 per cent loss in passenger car sales in both Illinois and Indiana was registered during November as compared with October, the showing in Illinois being slightly the better.

The decline in Ford sales from the preceding month was greater than in any other class in Indiana.

The following table indicates the losses in November as compared with October, and also with the high month of the year:

ILLINOIS

Class	Decrease from Oct. Per Cent	Decrease from High Month Per Cent
Fords	49	65
Low excluding Fords	50	78
Medium	30	75
High priced	39	66

INDIANA

Class	Decrease from Oct. Per Cent	Decrease from High Month Per Cent
Fords	56	72
Low excluding Fords	55	79
Medium	47	78
High priced	39	80

The monthly average of sales in Illinois dropped to 14,451 and in Indiana to 9676. Following is a table which gives the detailed figures:

ILLINOIS

Month	Fords	Low excluding Fords	Medium priced	High priced
January	4,574	1,380	4,053	1,013
February	4,183	1,031	3,093	698
March	5,444	2,190	4,317	685
April	7,994	4,101	7,225	930
May	8,199	4,618	7,879	973
June	6,735	4,597	6,262	780
July	8,332	4,105	6,732	839
August	8,428	3,348	4,694	714
September	5,228	1,623	4,281	531
October	5,729	1,971	2,970	568
November	2,894	970	1,797	342
Total	67,740	29,934	53,303	8,073

INDIANA

Month	Fords	Low excluding Fords	Medium priced	High priced
January	3,671	697	1,138	164
February	4,206	818	1,131	206
March	7,426	2,451	3,375	342
April	6,445	2,917	3,950	498
May	5,610	2,888	3,893	343
June	5,120	2,858	3,561	249
July	4,762	2,349	2,530	258
August	6,733	2,103	2,395	199
September	5,404	1,812	2,094	174
October	4,719	1,315	1,654	163
November	2,076	586	851	98
Total	56,372	20,794	26,572	2,694

These statistics were compiled from data furnished by Robinson's Advertising Service, Springfield, Ill., and Indianapolis Automobile Trade Association, Indianapolis.

Good Roads Dinner Will Precede Show

To Be Held at Plaza Hotel, New York, on January 4—MacDonald to Be Guest

NEW YORK, Dec. 26—Invitations have been sent by the National Automobile Chamber of Commerce to editors of general magazines and special writers to attend its "motor roadeo," which will be held at the Plaza Hotel, Friday evening, Jan. 4. In reality this will be a good roads dinner, which will be handled by two of the chamber's committees—highways, of which Roy D. Chapin is chairman, and traffic planning and safety, whose leader is George M. Graham.

Chapin will serve as chairman of the dinner, the principal guest being Thomas H. MacDonald, chief of the United States Bureau of Public Roads.

Built Around Coolidge Statement

The dinner is built around President Coolidge's statement to Congress, that "no expenditure of public money contributes so much to the national wealth as for building roads."

"What this expenditure totals, how it should be raised, what progress is being made, how highway traffic may be made safer, what relation the highway program has to national well being are among the questions we shall attempt to lassoo and corral, hence the term 'the motor roadeo' dinner," says the chamber in its invitation.

The first showing of the highway transport educational film, which was prepared under the direction of the Highway Education Board, the United States Bureau of Public Roads and the National Automobile Chamber of Commerce by the Ford Motor Co. will be made at this dinner. This firm shows the effect of good roads on the farm boys' lives.

Round-the-World Plane Viewed at Washington

WASHINGTON, Dec. 26—The first round-the-world flight by airplane is to be undertaken by the War Department, it has been announced. The attempt probably will be made within two months. A plane, especially built, already has been completed and was brought to Washington last week for inspection by officials of the air service.

The machine is being given various kinds of tests by army experts at Bolling Field. It was especially built by the Douglas Co. of Santa Monica, Cal., and will be driven by a Liberty twelve-cylinder 400-hp. engine, equipped with a reserve tank holding 600 gal. of gasoline and 50 gal. of oil, allowing a nonstop flight of 2300 miles. Lieutenant E. H. Nelson of the Army Air Service has been designated as pilot.

Plans are also being made by the War Department to fly a rigid ship of the Shenandoah type around the world and to the North Pole, and an appropriation of $50,000 is requested in the new budget to defray the expenses.

FINANCIAL NOTES

Hupp Motor Car Corp. directors have authorized the issue of 342,678 shares of treasury common stock to be offered to stockholders of record Dec. 24, at $12.50. Subscription rights terminate Jan. 10, 1924. The company has declared a quarterly cash dividend of 2 1-2 per cent, payable Feb. 1 to stock of record Jan. 18. This dividend applies to the new stock. The entire outstanding issue of preferred stock, having a par value of $500,000, will be retired.

American La-France Fire Engine Co., Inc., has authorized the issuance of $1,000,000 additional 7 per cent cumulative preferred stock and $1,000,000 common. Of this increase only $500,000 of the common will be issued at present. Both preferred and common stockholders will have the right to purchase the new common at $10 a share on the basis of $100 par value of the new stock for $1,000 par value of the old common or preferred.

Sparks-Withington Co. has declared an extra dividend of 50 cents a share on the common stock and the regular quarterly dividend of 50 cents a share on the common and of 1¾ per cent on the A and B preferred, all payable Jan. 2 to holders of record Dec. 20.

Overman Cushion Tire Co. has declared dividends of 1½ per cent on the common and X preferred stocks, payable Jan. 20. Initial disbursements of 1 per cent were made on both these issues on Oct. 25 last.

General Tire & Rubber Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable Jan. 1 to holders of record Dec. 29.

India Tire & Rubber Co. has declared a dividend of 1 per cent on common stock and 1¾ per cent on preferred stock to stockholders of record as of Dec. 11.

Motor Products Corp. has declared an initial quarterly dividend of $1 a share on the new and preferred stock, payable Feb. 1 to stock of record Jan. 20.

Goodyear to Move Quickly in Zeppelin Development

AKRON, Dec. 26—The new Zeppelin industry will be developed by the Goodyear Tire & Rubber Co. more quickly than was anticipated when the Zeppelin patent rights in America were purchased, according to semi-official statements.

It is predicted that the end of next year will find at least 3000 and possibly 5000 men employed in this division of the Goodyear company. When the patent rights were purchased it was believed that the production of these machines would not get under way for several years.

Goodyear is reported as being about to purchase additional land for its flying field at Wingfoot Lake which already is one of the largest in the country. Officials, however, emphatically deny the report that the company through New York connections is making efforts to buy the Curtiss airplane works.

BANK CREDITS

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

Trade in general was active last week, in spite of the continued warm weather. Reports indicate that holiday buying has surpassed all previous records.

Buying of iron and steel appears to have increased, instead of showing the seasonal recession which was expected. Prices of both steel and pig-iron are firm.

Car loading during the week ended Dec. 8 numbered 913,774, comparing with 835,296 during the preceding week (a holiday week) and 909,174 in the corresponding period last year.

The Department of Agriculture reported last week that 40,191,000 acres have been sown to winter wheat this year, as against 45,950,000 last year and 47,611,000 in 1921. This year's acreage, however, is still more than 19 per cent in excess of the pre-war average.

Cotton ginned prior to Dec. 13 amounted to 9,548,000 bales, comparing with 9,493,000 bales a year ago and 7,790,000 in 1921.

Crude Petroleum Dropped

Production of crude petroleum in the week ended Dec. 15 average 1,943,300 barrels a day, as compared with 2,006,150 in the preceding week and 2,280,700 in the week ended Sept. 9, the year's peak. Daily production is below 2,000,000 barrels for the first time since last May.

The Fisher index of wholesale commodity prices was unchanged last week at 150, the year's lowest figure. Bradstreet's food index declined from $3.33 to $3.30, comparing with $3.50 a year ago. The wholesale price index of the Bureau of Labor Statistics stood at 152 for November, a decline of one point from October and of two points from September. The Bureau's retail food price index, on the other hand, rose from 150 for October to 151 for November.

Decline in Discounts

Discounts by Federal Reserve banks declined $11,800,000 during the week ended Dec. 19, bills secured by Government obligations gaining $22,100,000 and "other bills discounted" decreasing $33,900,000. Purchased bills declined $7,000,000, and holdings of United States securities $15,000,000. A decline of $88,800,000 in total deposits was largely due to a loss of $73,900,000 in members' reserve accounts. The circulation of Federal Reserve notes increased $29,600,000 and total reserves declined $30,200,000, while the reserve ratio rose from 75.3 to 75.7 per cent.

Loans of reporting member banks declined $10,000,000 during the week ended Dec. 12. Investments increased $14,000,000, reserve balances with Federal Reserve banks $40,000,000, net demand deposits $141,000,000, and accommodation at Reserve banks $15,000,000.

Money rates continued easy last week, call loans ranging from 4½ to 4¾ per cent, while time loans were steady at 5 per cent.

Industry in Britain Urging Import Duty

Press Likewise Recommends That Some Action Be Taken by Parliament

WASHINGTON, Dec. 24—The passage of legislation by the British Parliament placing an almost prohibitory import duty on automobiles is being urged by the automotive industry and the press in England, according to information received by the United States Bureau of Foreign and Domestic Commerce.

So drastic are some of these proposals that a special report has been made to the Department by William M. Park, assistant trade commissioner at London. During the recent elections the trade commissioner points out that British automobile manufacturers and tire makers sought to make an issue of a protective plank on automotive products.

"Daily Mail" Sees Ruin

The following is a quotation from the "Daily Mail," owned by Lord Rothermere, who controls other London and Provincial British papers, urging that the British government immediately put up a high import duty on all imported cars:

Something must be done quickly to save the British motor-car industry from ruin. Many motor-car constructors are very near collapse, and it seems as if foreign-made cars will cut out the British car altogether. We need a token duty of £100 on each imported car, irrespective of value. In addition, we should impose 60 per cent upon the selling price of the car.

Imported parts and chassis should pay in proportion. . . . Motor-car tires ought to be subject to a duty equal to 25 per cent of their selling value. . . . We should like to keep out foreign cars altogether, or very nearly so, and in view of the Baldwin settlement of the American Debt I would strive to eliminate as far as possible all dollar purchases of manufactured goods or raw materials.

While the attitude of Lord Rothermere is cited as the extreme view on protection for the automotive industry of Great Britain, there are other British papers that take an opposite view, and are laudatory of the American automobile manufacturers.

Benefits Trade But Not Buyers

Such import duties, they urge, as those sought by the automotive industry would be an excellent thing for the trade, but nevertheless would work a hardship on the automobile buying public in England.

One of the leading advocates for a "square deal for the British buying public, irrespective of where the cars come from," is the Manchester Guardian, which says in part:

The choice of the motor-car industry as an illustration of the beneficial effects of a tariff on trade in this country, is an ill-advised one. . . . The buyer seeks not the cheapest car but the best. The improvement in the small car began on a pronounced scale when the industrial slump set in. That depression drove many owners of large cars to smaller types for the sake of economy. There is also the fact that the wider distribution of wealth as the result of war conditions has set up a new class of owners, the small-car man.

For these two classes, and more particularly the new class, the motor manufacturer had to cater because the demand was concentrated here. And he had to cater on competitive terms, for many new makers sprang into existence as the result of the first post-war boom, and the field of output was considerably enlarged.

It was the boom period, not the tariff, which increased the number of British manufacturers, and which has been felt by the British automotive manufacturer.

INDUSTRIAL NOTES

C. G. Spring Co. reports business in the first quarter of its fiscal year, ending Nov. 30 last, as showing an increase of 82 per cent over the same period in 1922. Orders for the new year are reported being received in increasing volume.

Libbey-Owens Expands Plate Glass Business

TOLEDO, Dec. 26—Construction of a grinding and polishing unit of what will eventually be a $15,000,000 plate glass plant will be started here in a few weeks by the Libbey-Owens Sheet Glass Co.

This first unit is to cost about $2,500,000 and will have a capacity of 8,000,000 square feet of plate glass a year. The entire output will go into the automobile trade to help fill the demand for glass for closed car bodies.

The main plant is at Charleston, W. Va., where the glass will be produced until the completion of the Toledo plant with gas producers and by-product recovery units.

The site at Toledo is at the junction of the Hocking Valley and New York Central railroads on the East Side and is 117 acres in extent.

The Libbey-Owens sheet glass process is one of drawing the liquid glass through rollers and annealing in a continuous sheet quite analogous to manufacture of paper from pulp.

Experiments also have been made with laminated glass for production of windshields which will not splinter if broken.

The Edward Ford Plate Glass Co., at Toledo, also has spent more than $2,000,000 in modernizing its plant here for production of plate glass. A big percentage of its product is taken in the automobile trade.

OVERFLOW AT ROAD SHOW

CHICAGO, Dec. 26—The demand for space at the annual road show of the American Road Builders Association, to be held in Chicago Jan. 14 to 18, is so great that the Wilson Building, near the Coliseum, has been obtained to accommodate the overflow. In addition to this building and the Coliseum, the show also will occupy the Coliseum Annex and the Greer Building.

METAL MARKETS

An almost buoyant spirit pervades the steel market at the year's close, the aggregate tonnage of orders placed by automotive consumers during the second half of December forming a very comfortable reserve for January operations. Of course, viewed in an every-day frame of mind, these orders are merely a routine continuation of automotive consumption at the rate that has been in evidence throughout the last half of the year, but coming at a time when the year's balance is being struck, it is only natural that they should add more cheer to the market's atmosphere.

If any deviations from the going quotations have occurred in this buying, it was only in isolated instances, and as a whole it may be said that the price structure of the last few months is being carried unimpaired into the new year. Significant nevertheless is the fact that now that this buying movement apparently has come to an end, producers lay great emphasis on the market's firmness which means that if perchance an additional buying wave should develop in January, consumers need not be astonished if they encounter a changed attitude on the part of sellers. The leading interest and the larger of the independents are apparently committed to a continuance of their present price policy until a really noteworthy change is to be seen in the demand.

There have been periods in the last few months when, had it not been for their strong leadership, prices would have sagged; just as there were spells when smaller producers might have obtained slight advances, had the forces which dominate the market not held it in check. There is no denying the fact, however, that many of the smaller steel mills depend for a balance on the right side of their accounts upon those flurries in which the transient demand exerts such pressure upon the large mills that many buyers are compelled to scout around for any available source of supply able to make delivery in time, and amid such conditions fancy prices are, of course, the rule.

It has been a long time since such a state of affairs favored the smaller mills, but they have not lost hope. Meanwhile theirs is not altogether a bed of roses. Makers of cold-finished steel bars, for instance, are decidedly in a quandary. Producers of hot-rolled bars insist that there can be no waiving of the $3 extra per net ton for screw stock announced some time ago. This makes the cost of the raw material to the cold-finished steel bar manufacturers 2.55 cents while the prevailing market for the finished product is 3 cents—a spread of $9 per net ton to cover the cost of cold-finishing.

Pig Iron.—All buying activity by automotive foundries is in abeyance, except for an occasional car of foundry iron, base prices for which range between $22 and $22.50.

Aluminum.—Fresh news developments are lacking, but many automotive consumers still have negotiations pending with the American producer or importers. The market is absolutely bare of resale offerings. Foundries making automotive specialties absorb considerable secondary material either in the form of scrap or ingots remelted from scrap.

Copper.—Only a very moderate interest is being shown by domestic consumers, and the market for the red metal wears a holiday air. What business passes in copper and brass products is of a routine character.

Calendar

SHOWS

Jan. 5-12 New York, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Eighth Coast Artillery Armory.

Jan. 26-Feb. 2—Chicago, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

Jan. 26-Feb. 2—Chicago, Annual Automobile Salon, Hotel Drake.

Feb. 4-9—Chicago, Tenth Annual National Motorcycle, Bicycle and Accessory Show, Broadway Armory, under the auspices of the Motorcycle and Allied Trades Association, A. B. Coffman, secretary.

FOREIGN SHOWS

April 2-13—Barcelona, Automobile Exposition, under the auspices of the Confederacion de Camaras Sindicales Espanolas del Automovilismo y Ciellismo, Palacio de Arte Moderno.

Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.

RACES

Aug. 3—Lyons, France, European Grand Prix.

April 27—Trapani, Italy, International Automobile Race.

CONVENTIONS

Jan. 5—New York City, Annual Meeting, Automotive Electric Association.

Jan. 14-18 — Chicago, Annual Convention and Show of the American Road Builders' Association, the former to be held in the Congress and the latter in the Coliseum.

Jan. 30-31—Chicago, Fourth Annual Meeting of the Automotive Electric Service Association, Congress Hotel.

Jan. 31-Feb. 1—Rochester, N.Y., Winter Sectional meeting of the American Society for Steel Treating, Hotel Seneca. W. H. Eisenman, secretary, 4600 Prospect Avenue, Cleveland.

May, 1924—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.

June, 1924—Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

S. A. E. MEETINGS

January—Metropolitan Section, No meeting in January.

January—Mid-West Section. No meeting in January. Mid-West Section will attend the annual meeting in Detroit in a body.

Jan. 9—Motorboat Meeting and Luncheon, Hotel Commodore, New York, 10 a. m.

Jan. 10—Annual Dinner of the S.A.E., Hotel Astor, New York, 6.30 p.m.

Jan. 17—Indiana Section, Motor Performance, H. D. Horning, Hotel Severin, Indianapolis, 8 p. m. Dinner, 6.30 p. m.

Jan. 22-25—Annual Meeting of the S. A. E.—Detroit.

Jan. 23—"The Carnival," Oriole Terrace, Detroit, 9 p. m.

Feb. 14 — Metropolitan Section, Vehicle Depreciation.

March 13—Metropolitan Section, Replacement Parts and Accessories.

April 17—Metropolitan Section, Fleet Maintenance, F. W. Winchester.

May 15 — Metropolitan Section, What Roads and Steels Do to Automobiles.

Advance in Aviation This Year Reviewed

NEW YORK, Dec. 26—A review of American aviation in 1923 is summarized by the Aeronautical Chamber of Commerce of America as follows:

Established thirty-three world's records, twenty-two of which are credited to the Naval Bureau of Aeronautics and eleven to the Army Air Service; designed, constructed and successfully operated the largest rigid airship in existence, the Shenandoah; developed and operated the first night airway, enabling the Air Mail to cross the continent in twenty-six hours; designed, constructed and successfully flew the world's largest airplane; private operators flew commercial planes a total of several million miles.

Staged flying meets in a dozen cities which were witnessed by a million people; further perfected the aerial torpedo; developed the smoke screen; made nonstop flights across the country, east and west and north and south; bombed battleships.

Improved operation of planes on and off aircraft carriers and in long cruises with the fleets; devised means to refuel planes in flight; put aircraft to work in a dozen ways, including transportation of passengers, mails and express, forest patrol, crop survey, destruction of gypsy moth and cotton boll weevil, map making, aerial photography, advertising and in other special services.

Chronicling the progress of commercial aviation in the year just ending, the Chamber says:

Commercial aviation, as represented by the useful peace-time services to which aircraft were put by the Federal departments, made distinct progress. Foremost was the Air Mail. The year saw the illumination of the first night airway—881 miles between Chicago and Cheyenne. On Aug. 21-24 inclusive, night flying tests in transcontinental mail were held.

The record of elapsed time from coast to coast was 29 hours 38 minutes westbound, and 26 hours 14 minutes eastbound. Letters which were mailed in New York to correspondents in San Francisco on Tuesday, Aug. 21, were delivered in San Francisco at 6 o'clock Wednesday evening and on Friday afternoon replies were received in New York, the elapsed time for the completed correspondence being 72 hours 13 minutes.

The fastest possible delivery of the mail by trains one way between terminals is 91 hours. The air time for the round trip across the continent, including an 11 hour 36 minute layover in San Francisco, was thus actually 18 hours 47 minutes shorter than the minimum time required for a letter to travel by train one way.

This was recognized as shrinking the business map of the United States to less than one-third of its present size.

MacDonald Reports on Road Building in U. S.

WASHINGTON, Dec. 26—A total of 8820 miles of Federal-aid roads, of all types, was completed during the fiscal year ending June 30, 1923, according to annual report of Thomas H. MacDonald, chief of the Bureau of Public Roads, just made public. The year's construction brings the total Federal-aid highway projects completed up to 26,526 miles, the figures show.

Construction now in progress amounts to 14,772 miles, which is 53 per cent completed, while projects totaling 6917 miles have been approved for immediate construction.

"The outstanding achievement of the year has been the work done in selecting the roads to constitute the Federal-aid highway system," the report sets forth. "This has been done in accordance with the provisions of the Federal Highway act, which requires that a system of roads consisting of not more than 7 per cent of the total rural mileage in each State be designated, and that all Federal aid be spent on such a system. The total mileage of rural roads in the United States is 2,859,575 miles, which will limit the Federal-aid highway system to 200,170 miles."

Employment Declined Slightly in November

WASHINGTON, Dec. 26—A decrease of 0.21 per cent in the number of persons employed in the automotive industry during November, as compared with the previous month, is shown in the monthly survey of the United States Employment Service of the Department of Labor.

Figures compiled from a representative list of 1428 firms, each employing 500 or more workers, show that out of fourteen major industrial groups, seven decreased employment and seven increased it.

Those showing a decrease, in addition to the automotive industry, are iron and steel, 2.85 per cent; leather and its finished products, 2.35; foods, 1.6; railroad repair shops, 1.38; chemicals and allied products, 0.99, and beverage manufacturers, 0.09.

The automobile industry in Michigan, according to the survey, shows a reduction in forces attributed to normal conditions. In Flint a shortage of skilled and semi-skilled workers is experienced. One plant is temporarily closed there for alterations, and others are operating with somewhat reduced forces.

In Jackson 300 men have been laid off by three manufacturers, and another concern has dismissed 100 men.

Roads Bureau Will Stage Exhibit at New York Show

WASHINGTON, Dec. 24—One of the exhibits of the national automobile show, to be held in the armory at Kingsbridge Road and Jerome Avenue, New York City in January, will be the Federal Bureau of Public Roads exhibit, showing what the Federal Government expects to accomplish in the next twenty years in Federal-aid highway construction.

The exhibit of the bureau will be in charge of R. E. Royal, who will detail the highway program.

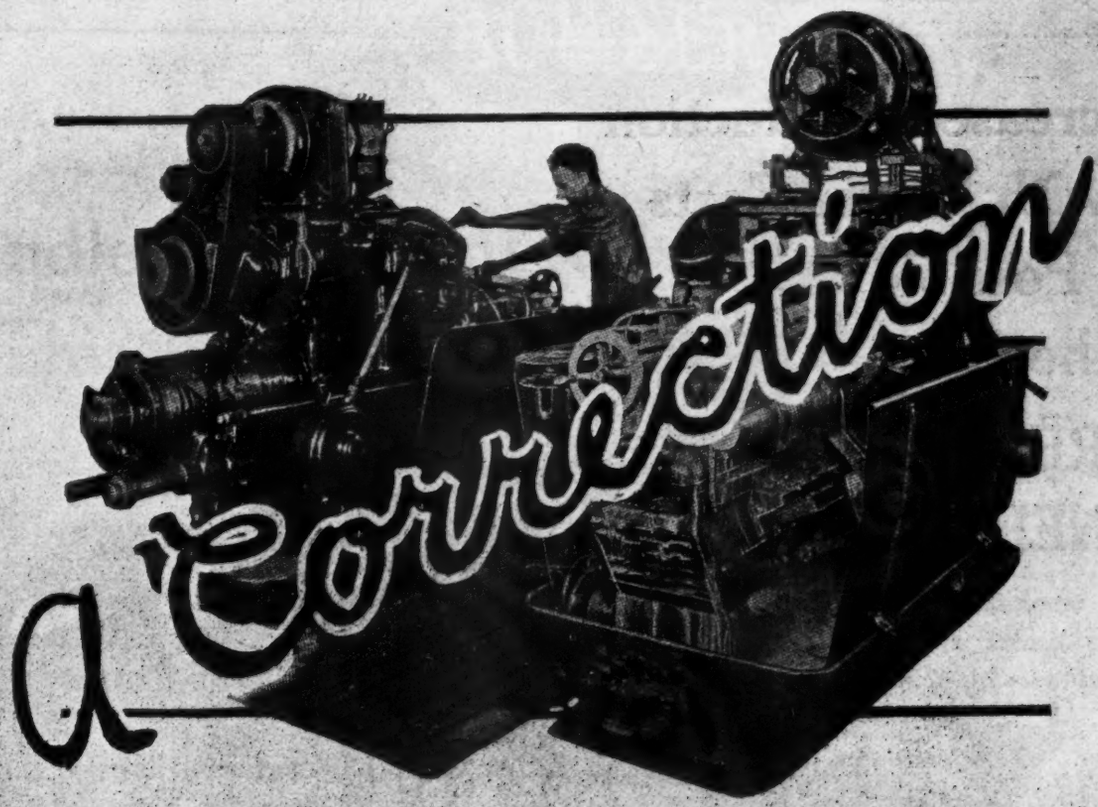
The largest and finest-equipped body hardware plant in the world, invested with an organization keenly alive to the requirements of modern body construction; a group of experts whose ingenuity and broad experience is clearly manifested in the *workability* and *durability* of Ternstedt *proved-in-service* products.

Built Better for Better Bodies

TERNSTEDT

World's Largest Manufacturers of
AUTOMOBILE BODY HARDWARE

DIVISION OF FISHER BODY CORPORATION



A Correction

A Happy Combination

—2 Fay Automatics and an Operator

Two Fay Automatics facing each other, the operator between them—with an arbor-press at his elbow. This is the floor-space layout in which the Fay Automatic has made so many fine production records recently.

15 hubs an hour is the production of this combination when used as the second-operation group.

In another case, the daily production of this group proved greater than FIVE operators and FIVE machines of another type.

Still another case is that in which an order for 58 additional Fays came to us as a result of the performance of two Fays and an operator, arranged as above.

On a certain axle housing job a 300% increase was reported.

In most of the above instances the first operation was performed on the Hartness Double Spindle Flat Turret Lathe—the combination of the two machines rendering unbeatable from a production standpoint.

Time-estimates from blueprints or actual samples gladly furnished.

A Should read Two orders totaling 58 machines

FAY AUTOMA

JONES & LAMSON MACHINE CO.

Also makers of the Hartness Flat Turret Lathe

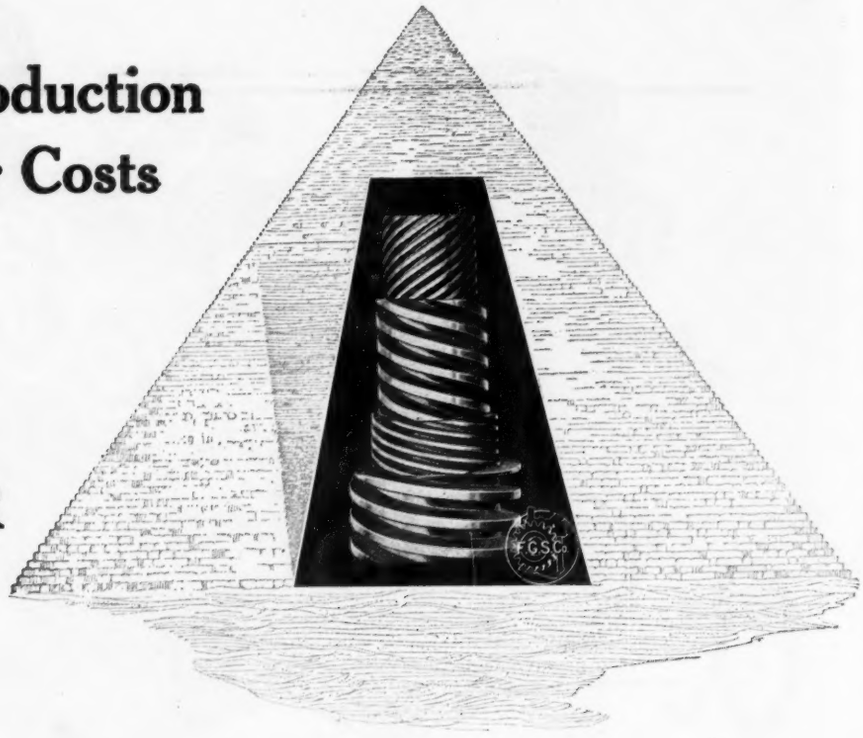
SPRINGFIELD, VERMONT

503 Market St., San Francisco, Cal. 9-10 Water Lane, Queen Victoria St., LONDON, Eng.

AGENTS: France, Spain and Belgium—F. Auberty & Co., 182 Rue Lafayette, Paris; Holland—Spliethoff, Beeuwkes & Co., Rotterdam; Japan, Korea, etc.—Mitsui & Co., Ltd., Tokio; Australasia—McPherson's Pty. Ltd., 554 Collins St., Melbourne; Stockholm, Sweden—A. Bol Oscar Lindbom, Postbox 420.

GEAR SHAPERS AND GEAR SHAPER CUTTERS

Increased Production with Lower Costs Possible on the THREAD GENERATOR



This interesting booklet tells the whole story. Do you want a copy?

Illustrated are a few of the many types of worms that have been cut on the THREAD GENERATOR, and on which production has been greatly increased. Production on the THREAD GENERATOR, when compared with milling, is increased approximately in the same proportion as there are number of threads on the work. For instance, if you are cutting a triple-threaded worm by milling, the THREAD GENERATOR will increase your production approximately three times, and will give you a better job.

Descriptive literature on the Thread Generator will be gladly sent to Engineers, Production Managers, and other executives interested in Reducing Production Costs.

The Fellows Gear Shaper Company

Makers of Gear Cutting Machinery and Cutters for the Past Quarter of a Century

Springfield, Vermont, U. S. A.

Foreign Agents: Alfred Herbert, Ltd., Coventry, England; Societe Anonyme Alfred Herbert, Paris, France; Societa Anonima Italiana Alfred Herbert, Milan, Italy; Alfred Herbert, Ltd., Yokohama, Japan; Societe Anonyme Belge Alfred Herbert, Brussels Belgium; Alfred Herbert (India) Ltd., Head Office, Calcutta, India; Bohm & Bormann, Berlin, Germany. Pacific Coast Representatives: Harron, Rickard & McCone, San Francisco and Los Angeles, California; Nevada; Arizona.

THREAD GENERATORS AND THREAD GENERATING CUTTERS

TANKS DEPENDABLE PUMPS

BOWSER ESTABLISHED 1885

Handle Your Paint Oils for Less Money—This New Free Chart Will Tell How

This great Company will definitely guarantee that you will save money in 1924 on paint oil storage (both on the oils and on the labor) if you adopt Bowser tanks as standard.

We will undertake to prove our case with one of our "Efficiency Charts," if you will tell us how many kinds of oil you store and how many gallons of each you use each year.

With those figures to start on, we can tell you how many gallons of valuable oils are wasted annually, by careless work at the spigot of barrels and drums; how many gallons get away because the measure overflows a few drops; how many gallons never get drained out of the drums; how many gallons thicken up and are thrown away.

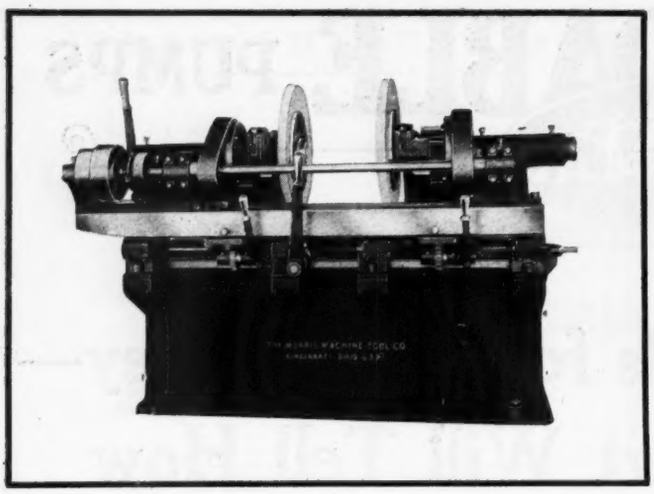
Each "Efficiency Chart" is drawn up by an experienced engineer. Figures are checked by an accountant. Your "Chart" is prepared for you; it will fit only your plant. Be sure to get it at once.

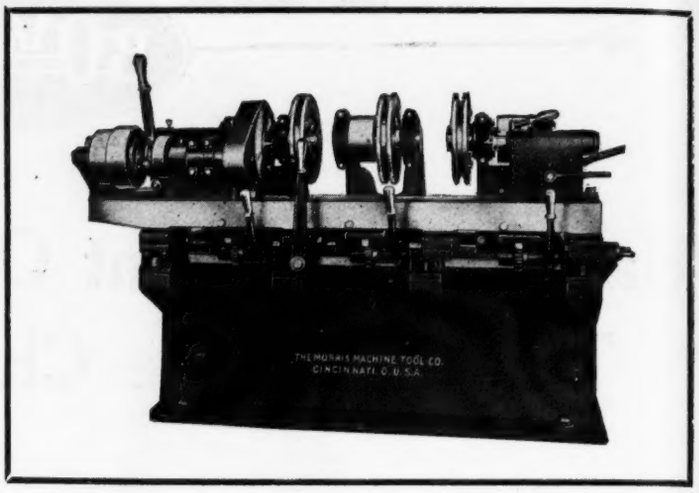
Our engineers will figure exact costs of a Bowser installation just big enough for your business, compute interest, depreciation, etc., and estimate labor savings. Thus, they will show you the *exact savings* you will make in real money!

When you have seen your "Efficiency Chart" you can determine for yourself whether to buy; your only obligation is to look the "Chart" over carefully. Write us today and get in line to making more money in 1924!

Address the Paint Storage Division—Desk A42

S. F. BOWSER & COMPANY, Inc.
Pump and Tank Headquarters
FORT WAYNE, INDIANA.
Sales and Service Offices and Representatives Everywhere





It's that first thousand miles that makes—or BREAKS car reputations

The breaking-in period — the first 500 or 1000 miles—is a period of RAPID INITIAL WEAR. The reason for this rapid wear in crankshaft bearings is plainly seen under a microscope. The microscope shows the average bearing made up of countless minute hills and valleys—tool-marks left by the grinding-wheel.

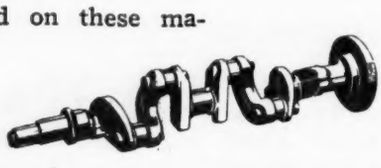
During the first running, two things happen —the high spots or peaks tend to ream out the babbitt, enlarging the bearing. And as they must take the entire load, they quickly get worn away, still further enlarging the hole. Result—after a thousand miles—car buyers talking of the INCREASING NOISE of their engines at a time when they should be most enthusiastic.

As a solution of this very great SALES-RESISTANCE, several engine-builders are utilizing Crankshaft Bearing BUFFING. Already a number of Morris Buffing Machines are in daily use, on regular production. Crankshaft bearings finished on these machine-tools can be fitted in a manner that permits driveaways operating at maximum motor speed without damage to crankshaft bearings. The usual rapid initial wear is eliminated, no breaking in is necessary, the motor remains quiet.

The Morris Machine is built by machine-tool builders of long experience—it uses hard felt wheels and an abrasive. The cost of the process is more than offset by other economies it permits. Complete particulars gladly mailed upon request.

Microphotograph of a hand-polished crankshaft bearing. Countless tiny teeth which ream away the babbitt the first thousand miles of driving.

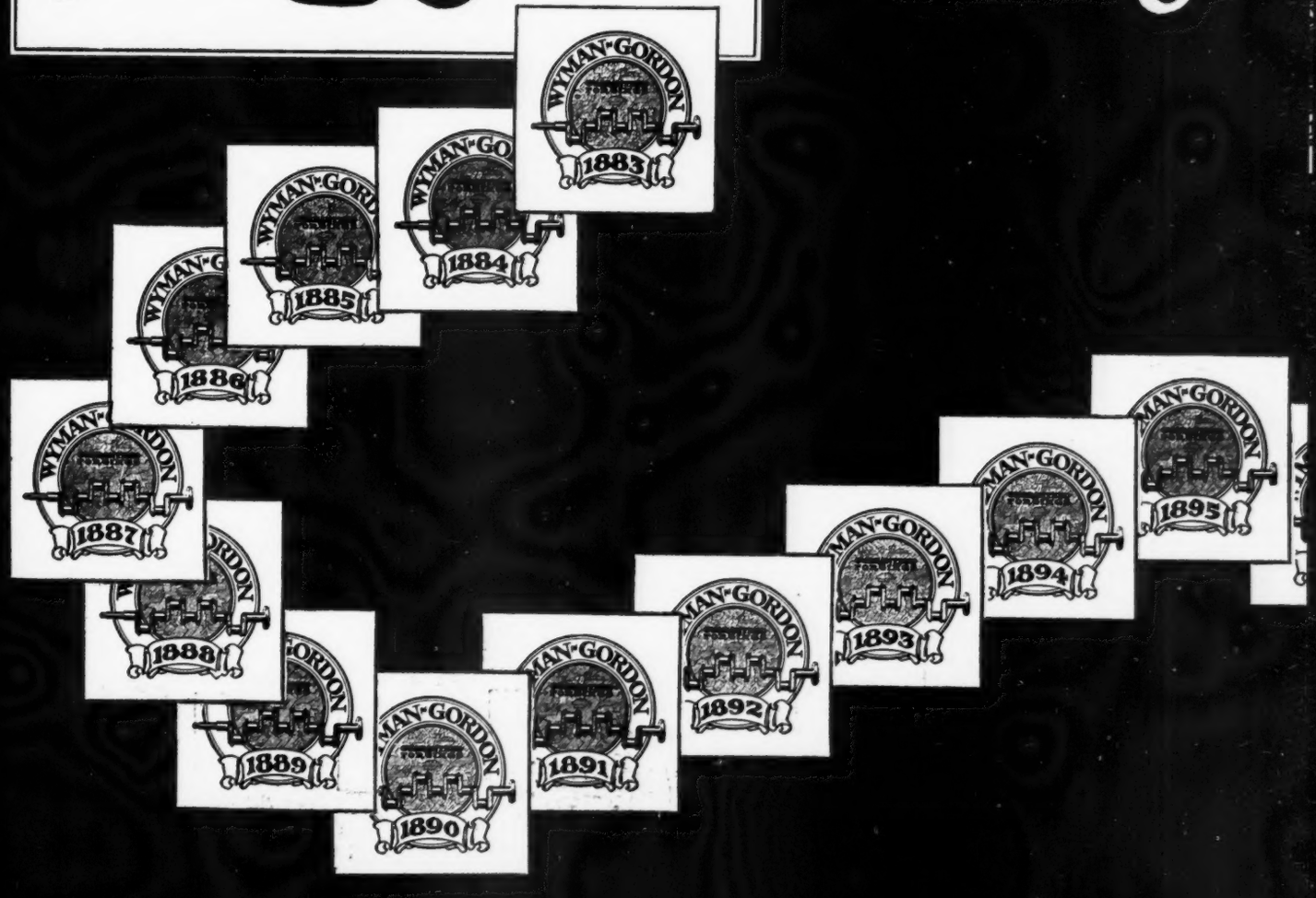
Microphotograph of cylindrical surface finished on the MORRIS Crankshaft Buffing Machine. No "teeth." No high or low spots—100% contact with the surrounding babbitt. Exceedingly long-wearing.



THE MORRIS MACHINE TOOL CO., Cincinnati, Ohio, U.S.A.

WYMAN-GORDON
Makers of Guaranteed Crankshaft Forgings for 40 Years

Since long before the horseless carriage



WYMAN-GORDON *Then ~*

ORIGINAL factory and office building of Wyman-Gordon as they appeared in 1888—five years after the company was founded.

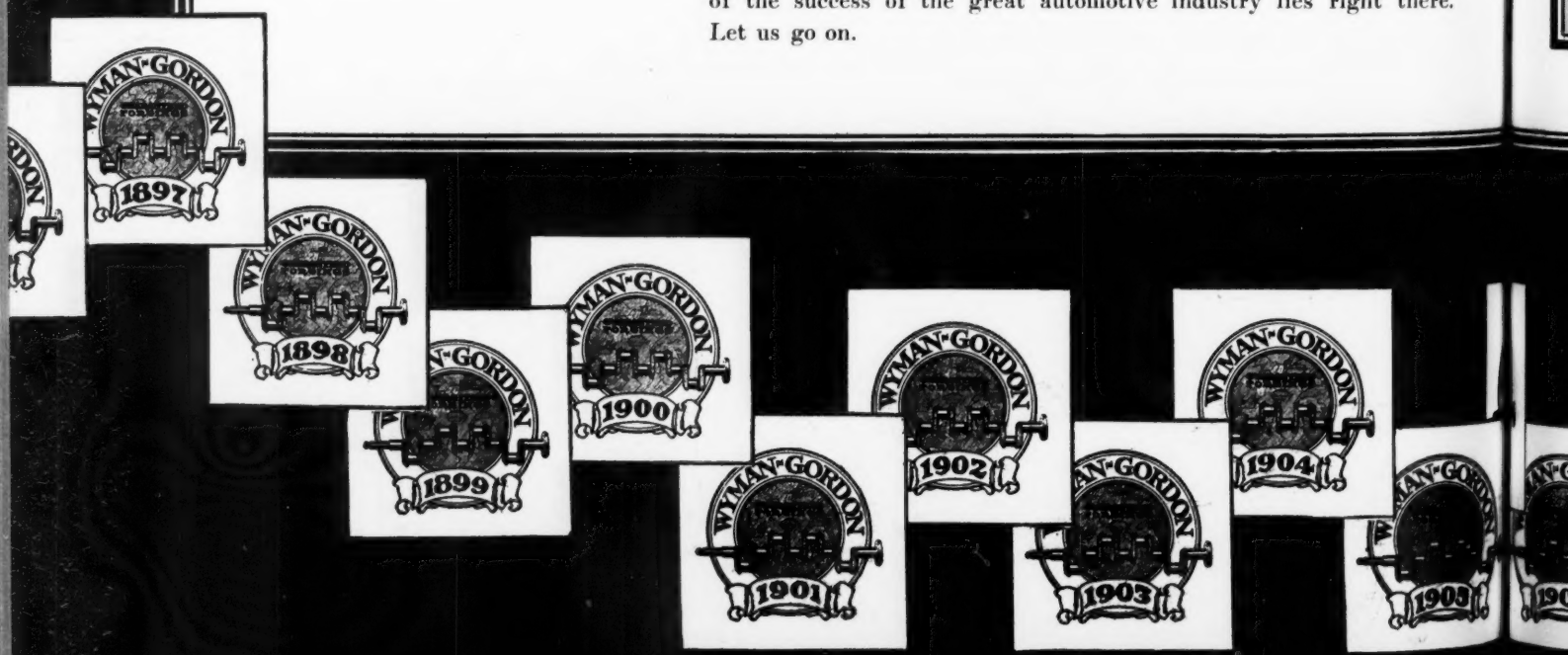
Group of men shown is entire force employed at that time.

TO review the life of an individual, a great business or a mighty industry is merely a matter of recording what has been accomplished. To look forward to progress requires keen foresight and unlimited vision.

As we look backward through the inspiring history of the automotive industry and the many great business enterprises that have grown apace with it, by serving it, we can but marvel at the foresightedness and the clear-cut vision of our predecessors, the men who saw, in the then far distant future, something of the place which this industry holds today.

That we, the Wyman-Gordon Company, had a part in the building of this great industry makes us justly proud. That we are still a factor in its growth enthuses us.

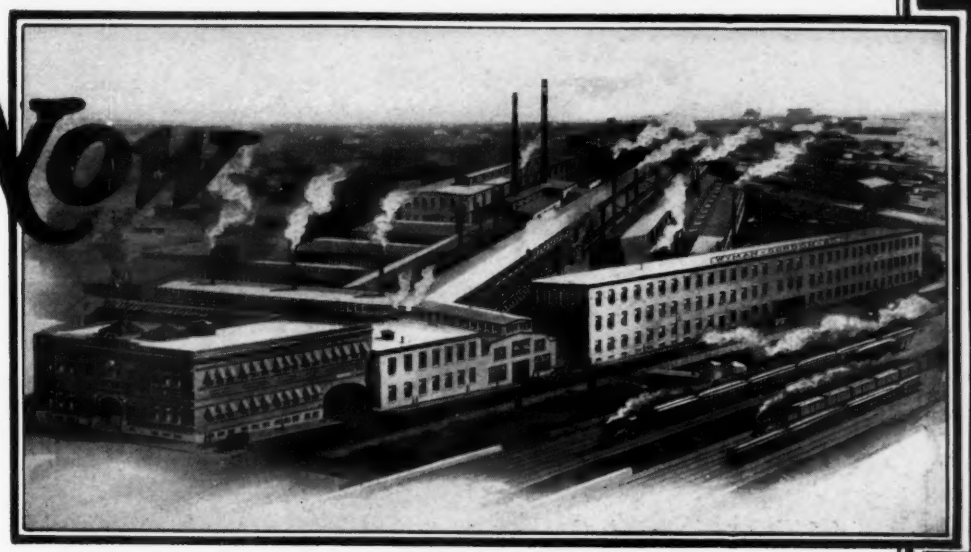
Looking backward, as we go forward, we are impressed with one thought: Isn't progress, after all, merely a matter of each of us knowing our division of responsibility and bending our whole energy to the fulfilment of that trust? We think so. We think that the secret of the success of the great automotive industry lies right there. Let us go on.

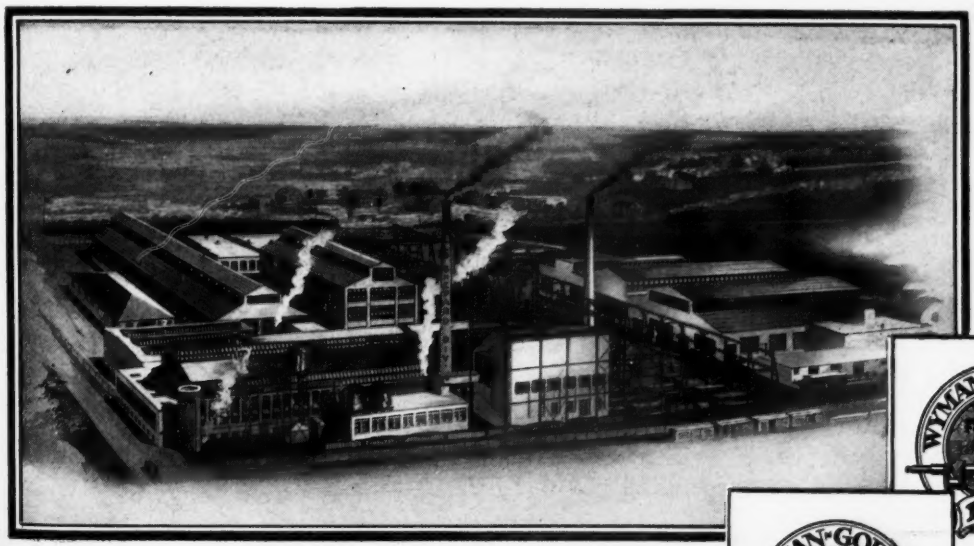


and Now

THE two great plants of the Wyman-Gordon Company TODAY.

The Worcester Division at Worcester, Mass. The Ingalls-Shepard Division at Harvey, Ill.





THE confidence of the automotive industry in Wyman-Gordon Crankshafts is exemplified in their acceptance by the industry as standard for Quality and Service.

The Future

IT seems a far cry from the first Wyman-Gordon crankshaft, made forty years ago, an iron crank for an early power loom, to the present product used in the multiple cylinder high speed motor.

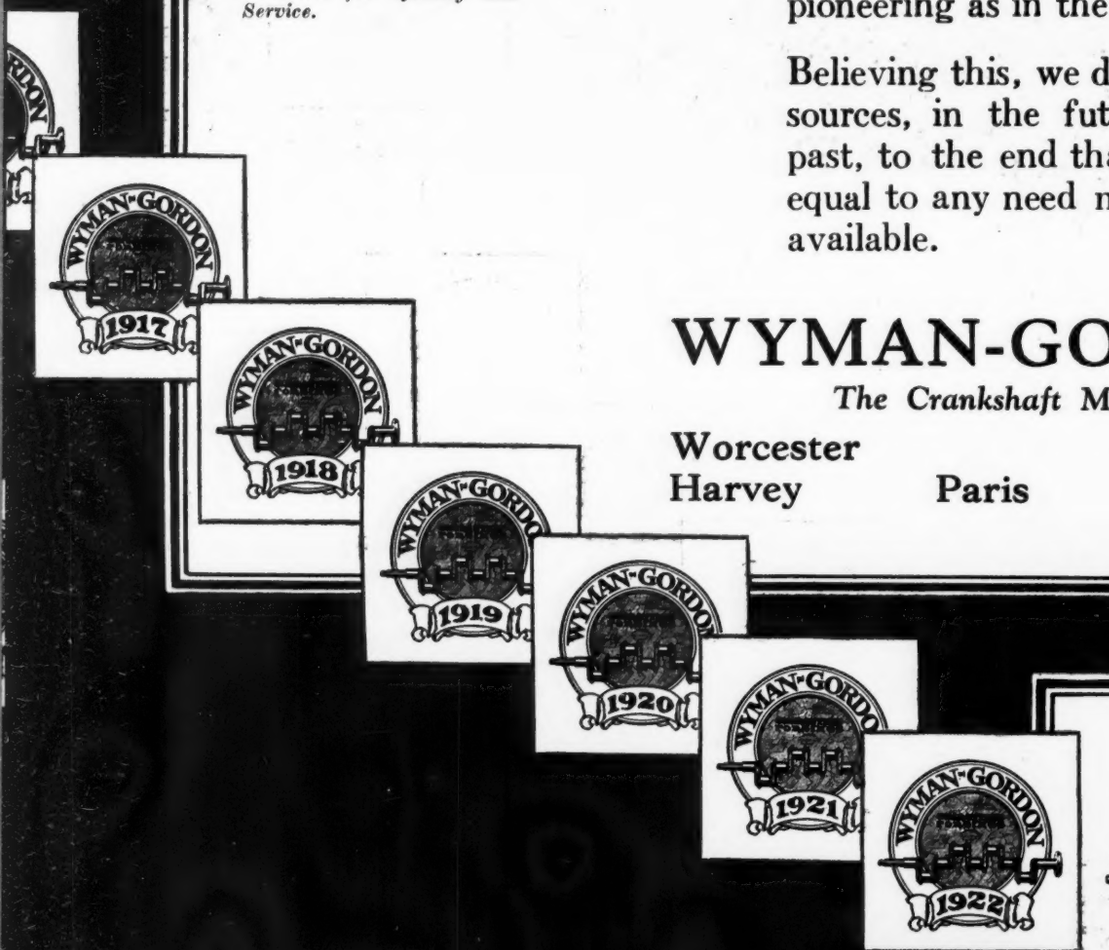
The progress truly has been remarkable, but as we look into the future, the opportunities for crankshaft development warrant the same painstaking research and pioneering as in the past.

Believing this, we dedicate our resources, in the future as in the past, to the end that crankshafts equal to any need may always be available.

WYMAN-GORDON

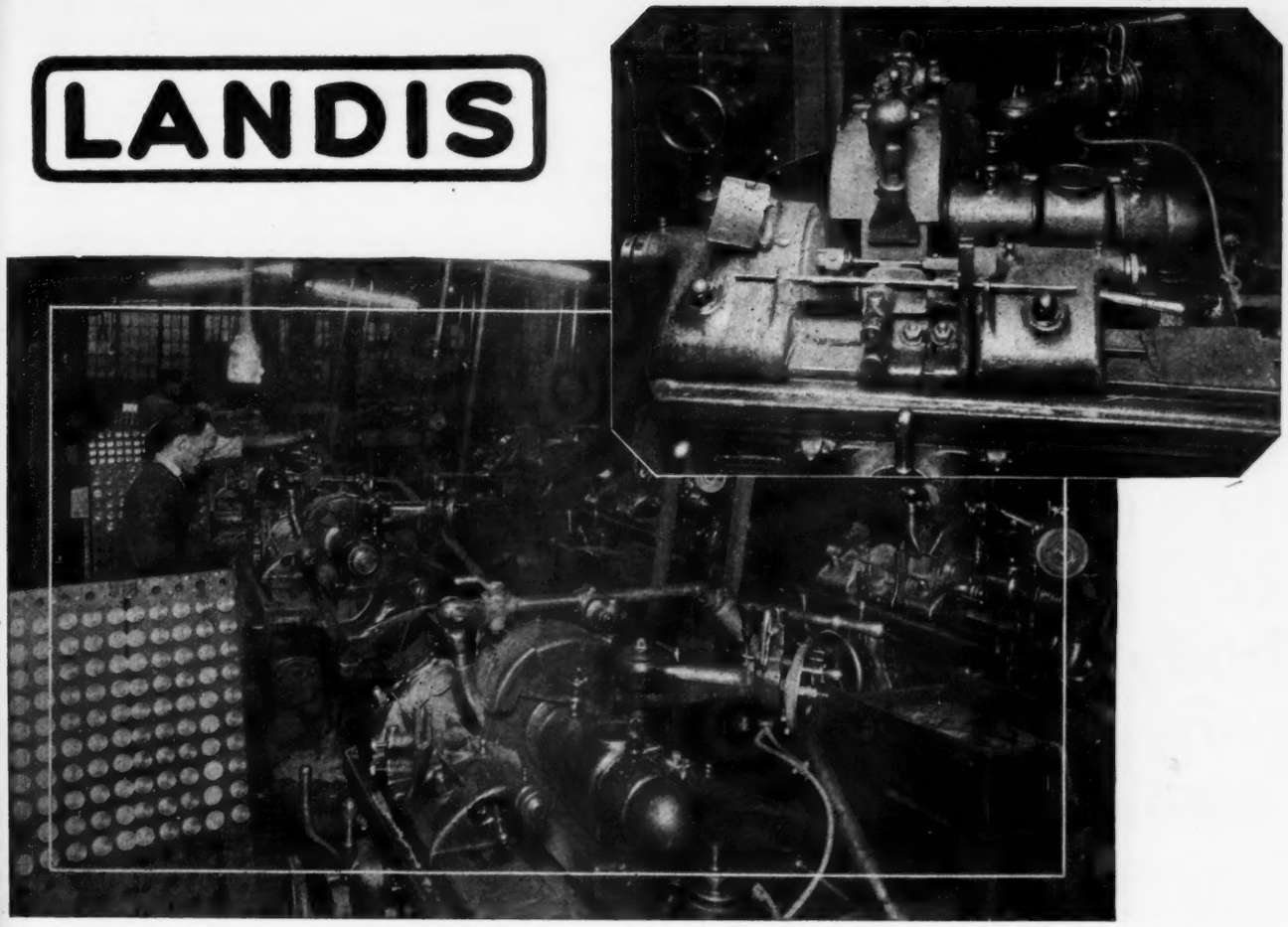
The Crankshaft Makers

Worcester — Cleveland
Harvey — Paris — Detroit



Today

LANDIS



Valves test operating facilities

Hundreds of Thousands are handled on the Landis

The handling of poppet valves is a test of the operating conveniences of any grinding machine.

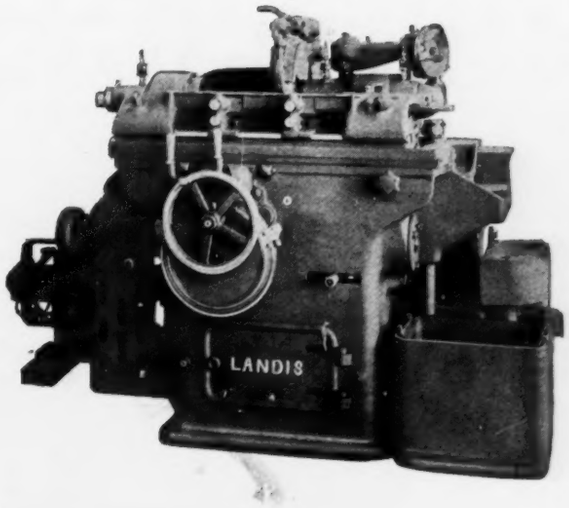
Landis design seems to fit perfectly this kind of grinding—where the duration of the cut is but a few seconds and the work changed almost continuously.

The broad-faced wheel does not traverse. It merely feeds into the work to the required depth, maintaining the diameter of the stem within .00025" plus or minus.

The battery of eight Landis Machines maintain a production of 180 an hour on valve stems.

Production engineers with similar grinding work who may not now be getting comparable production are invited to take advantage of Landis experience, which dates back to the very beginning of production grinding.

Send us blue prints or actual samples of ANYTHING that you would like to grind—we stand willing and ready to help you, if we can.



Landis Tool Co., Waynesboro, Penna.

New York Office—30 Church Street

Raulang
AUTOMOBILE BODIES

TO CAR MANUFACTURERS:

Closed bodies will be even a greater factor in 1924 than in 1923—and the stability of your body builder will be correspondingly more important!

Tear out the above statement and put it before the man who most needs to ponder it!

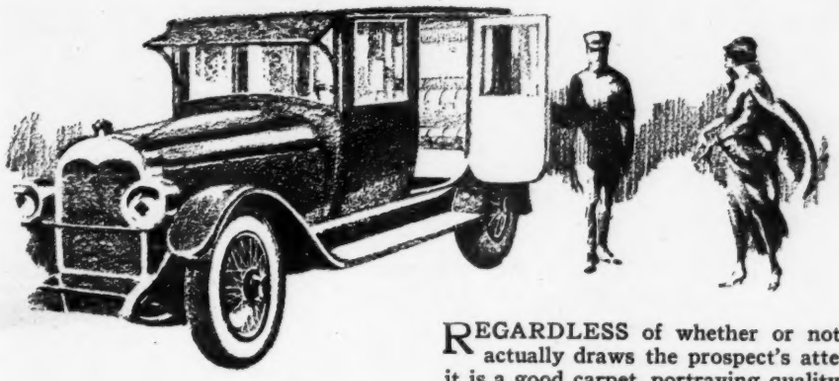
CERTAINLY not less than ten car manufacturers in 1923 were disappointed, either in the quality of closed bodies delivered on their contracts, or in the rate of delivery.

Among these failures were no Raulang customers; for every Raulang contract is backed by $4,000,000 in capital and surplus; proven ability in manufacture as well as in designing; and a record of faithful performance since the very beginning of the automotive industry.

Present expansion plans will provide for a limited amount of additional business. How can you more surely smooth away your closed-body difficulties than by permitting this organization to take that portion of your burden on its shoulders?

RAULANG BODY DIVISION
The Baker R & L Co.
CLEVELAND, OHIO. U.S.A.

Is your carpet "just a carpet" or is it a Sales Feature?



THE SIGN OF SUPERIORITY

The GOODS That Make Good

Hirst - Roger Carpets made to your specifications, complete that harmony of interior details which so delights the prospective buyer.

REGARDLESS of whether or not the salesman showing your car actually draws the prospect's attention to the carpet on its floor, if it is a good carpet, portraying quality in fitness and finish, the subconscious effect is there, strengthening the impression of quality throughout, even in the little things. For the well chosen carpet, an artistic complement to the harmonious interior which you have provided, acts as a true criterion of the car's real value, and, as such, is a live, vital sales help.

Hirst-Roger carpets are specially woven to stand the severe strain of car use. They retain their resilient pile, their color and freshness, despite frequent trampling and grinding under wet, muddy feet and under quick drying and abusive cleaning.

The aim and purpose of the Hirst-Roger organization, specialists in the manufacture of automotive carpeting, is to help car manufacturers select carpets which will be precisely suitable. Their service means competent council in the securing of artistic effects, in achieving an atmosphere which truly fits the car and in providing carpets of unsurpassed quality and workmanship.

Your carpet can help you sell your car. Write for details of the Hirst-Roger service.

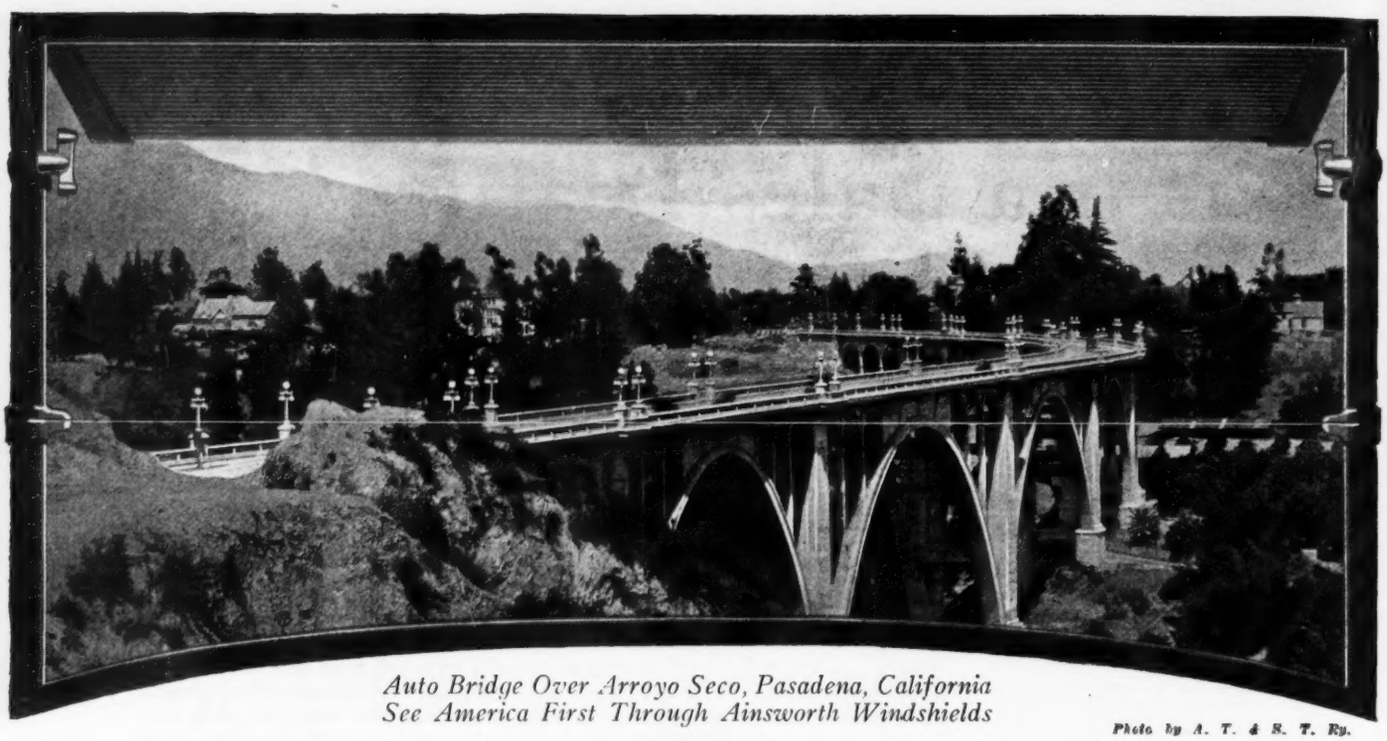
THE HIRST-ROGER COMPANY, Philadelphia, Pa.

Detroit Representative:
Joseph H. Austin Co.

New York Representative:
Charles Scotson & Co.
17 West 60th Street

HIRST-ROGER
CARPETS FOR CARS

See the Hirst-Roger samples of fine carpets. Get a Hirst-Roger quotation before you sign your carpet contract.



Auto Bridge Over Arroyo Seco, Pasadena, California
See America First Through Ainsworth Windshields

Photo by A. T. & S. F. Ry.

TRANSPORTATION

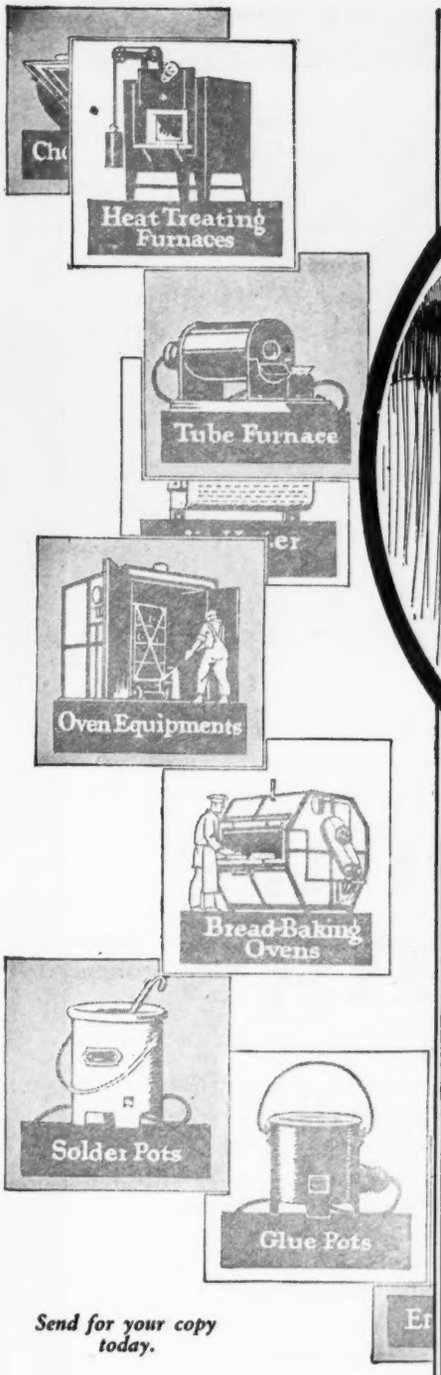
From coast to coast there exists a fine appreciation of the necessity to provide every convenience for the motorist.

Highways, guide books, accommodations and automobiles all combine to make motor transportation a pleasure.

Ainsworth Windshields and Visors play an important role in motor travel by furnishing correct driving vision and protection from the elements.

The Ainsworth
WINDSHIELD AND VISOR

AINSWORTH MANUFACTURING COMPANY
DETROIT, MICHIGAN



Send for your copy today.

An occasional publication containing accounts of heating installations of interest to every executive. We will be glad to put you on the mailing list. Write for a copy today.

Make It Warm for Your Watchman

Your watchman is human, and, like others, he cannot work efficiently when cold. Two or three space heaters in the sentry house will keep him warm in the coldest weather, at a surprisingly low cost, and without danger of fire.

The duties of a crane man require that he be ready to prompty respond to exacting responsibility at any time. If his crane cab is chilly, if his fingers are stiff, he will not be able to properly control his crane. Westinghouse space heaters will increase the efficiency of your crane man by keeping him warm.

Order a box of these convenient heaters today, and have your electrician install them in some of those hard-to-heat places around the plant. Then you won't have to worry about the heating problem.

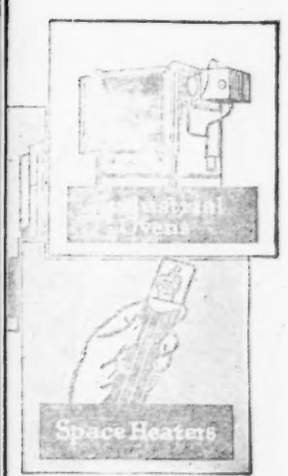
Get in touch with the nearest Westinghouse sales office today. The office representative will gladly give you data on the various sizes.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries
Consult your telephone directory

W WESTINGHOUSE ELECTRIC

Electric heat has many uses. A few of these applications are suggested by the small sketches. Electric heat can be used in your business.



Westinghouse

New Departure Ball Bearings

Where Faith is Well Founded

MILLIONS of motor cars are driven today by those who would be absolutely helpless if called upon to render more expert attention to their vehicle than that of changing a tire.

Yet how many of this number would hesitate to undertake a 200-mile jaunt at a moment's notice?

This confident independence is due, we believe, not so much to the proximity of service stations and fellow tourists as the well-placed confidence in their "motors" to negotiate any trip without falter.

Almost all parts of the modern motor car function properly for extended periods without readjustment.

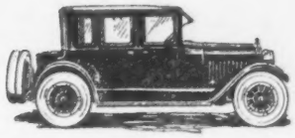
In bearings, the New Departure ball type, by principle and superfine materials and manufacture, has been developed to a point so closely approaching perfection that it funtions properly for the life of the average motor car—and without wear which must follow in other bearing types which require readjustment at stated intervals.

THE NEW DEPARTURE MANUFACTURING COMPANY

DETROIT BRISTOL, CONN. CHICAGO

56 Victoria St., London, S. W. 1, England

Fear and Finishing



ABOUT seventy percent of automobile bodies are still being finished with paint and varnish.

The centuries of paint tradition and the craftsmanship which has been handed down from father to son through countless generations command our respect.

But we, in common with millions of other people, are continually struck by the stubborn fact that the finish on the average motor car of today does not serve its purpose—it checks, or lifts, or becomes lustreless in a very few months.

Even with such evidence of unfitness before the automotive industry—it is no light matter to uproot and throw out a system of finishing which time has entrenched so thoroughly.

The up-to-date paint superintendent is quick to understand the Oxvar method and its revolutionary advantages. He knows it is unlike paint and varnish, not a matter of guess work—an unexplored mystery to be feared—but a simple thing that can be proved up in the laboratory quickly and conclusively. It needs no endorsement of tradition. It is not a craft. It is a scientific process.

By the Oxvar method, you can give any body from three to five coats of high-baked enamel in from 4½ to 7½ hours at less than ½ the cost of average paint and varnish finishing.

Remarkable as it may seem, a wood-frame body can receive Oxvar 400° enameling perfectly. The same method that applies to all-metal bodies, applies to wood-frame bodies, except that wood frames are coated to protect them against the successive 400° heats.

The result is a finish that lasts as long as the car. It cannot check or lift or lose its lustre—because the Oxvar process has removed the causes which lie back of these age-old defects.

We wish to place at your command production records showing the result of the Oxvar method, also complete laboratory tests confirming what has been proven in practice.

A booklet describing Oxvar (for production of twenty-five bodies or more daily) will be mailed on request.

OXVAR

OXFORD VARNISH CORPORATION

Main Office: Empire Building, Detroit
Plant: Toledo, Ohio

The Industry's Scrap Book

NEW STYLE IN GASOLENE MOTOR CARRIAGES

GASOLENE MOTOR PARK TRAP

THE DAVISES STILL REPAIRING

Toledo, Sept. 30.—The trans-continental automobile trip of Mr. and Mrs. John Davis has not proven a great success up to date. For nearly a month the Davises have been trying to get out of Toledo, but without success. Repair work on their machine kept them here for three weeks. A week ago Sunday they broke away from the city, but their tour was short-lived for in Michigan, less than a score of miles from here, they broke down again and are stalled. The automobilists were to represent a newspaper syndicate.

A MATTER OF VANITY

"I do not think the automobile is going to be popular for any length of time with our fashionable people," said Adjutant General Corbin today. "During my recent stay in Newport I met a number of wealthy people who had purchased automobiles early in the season, and I asked them how they liked these novel vehicles. Almost without exception they told me that they did not think the fad for them would last long. They said the automobile would never take the place of the horse with the fashionable set. The fact of the matter is, the swell woman does not appear to as great advantage in an automobile as she does behind a pair of fine horses."—Brooklyn Eagle.

INN FOR TOURISTS—A WOMAN'S DREAM

"The automobile has opened a new field for women who have their own living to earn," observed a woman the other day who proposes to become the proprietor and manager of a new old-fashioned country inn. "People are just beginning to appreciate the many advantages of this novel means of travel," she observed, "and by next season I believe it will not only have taken the place of horses, but for short pleasure trips must rival the palace and observation cars.

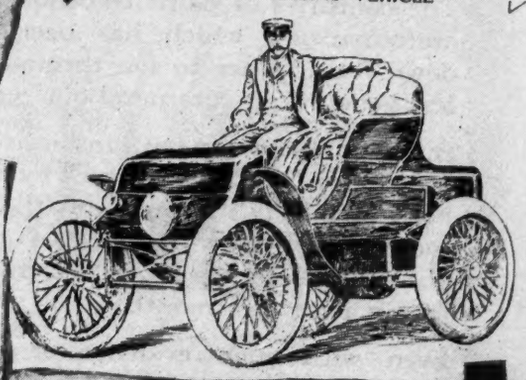
"Don't imagine I refer to our bec... ing motormen as a profession. I ... that automobiles will so increas... travel over country roads that ... bound to be a demand for well... lic houses. Inns after the... those famous in th... coach and whi...

...ioned looking, remodeled ... of the Blue Dragon ... other famous ho... stopped in Gre... house, and ... Virginia ... are h... the...

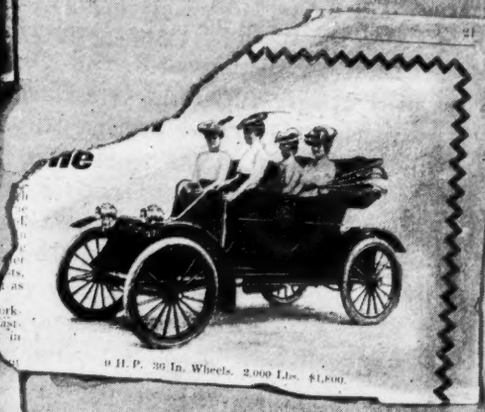
THE DAVISES STILL TRAVELING

Mr. and Mrs. John D. Davis have reached Chicago with their ill-fated motor carriage. Little of the original motor and running gear mechanism with which the couple started from New York under the auspices of the New York Herald was left, the principal remainder, it is said, being the rear axle; and that broke at the crossing of 71st street and Bond avenue in Chicago. When a new axle shall have been fitted it is the intention to proceed on the way to San Francisco.

FIRST AMERICAN RACING VEHICLE



THE INCLINE AT THE INDIANAPOLIS SHOW



9 H.P. 30 In. Wheels. 2,000 Lbs. $1,800

Historical Material by Courtesy Motor Age

ROLLER BEARING CO — IS 25 YEARS OLD

The Timken Scrap Book

AUTO INDUSTRY IS 25 YEARS OLD

Registered Owners During Quarter Century Have Reached Ten Million

NEW YORK, April 21.—The automobile industry as an industry has just celebrated its twenty-fifth anniversary. A quarter of a century as the industry, which has produced over 10,000,000 registered owners during that period, remodeled the planning of cities and introduced the traffic "co" struggled into being with the delivery of the first American-built car to purchaser.

From the inital start the ... record of owner... until ...

Friction Saver vs Whip

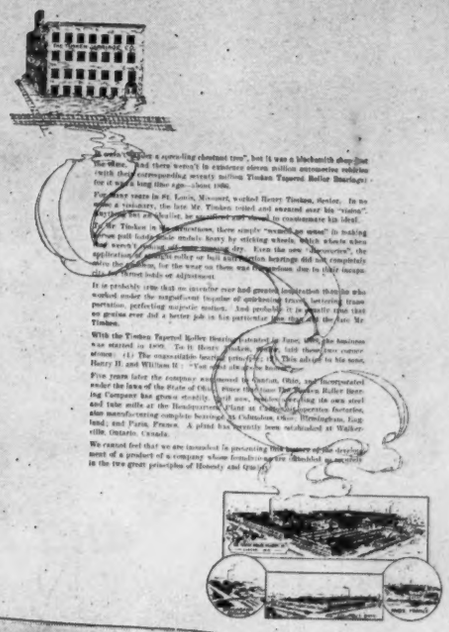
Your horse is all right. You wouldn't have to resort to old-time methods of urging him; he'd live longer and serve you better, if you'd replace the whip with the

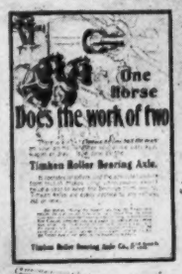
Timken Roller Bearing Axle.

Careful, scientific experiments show ***50 per cent reduction in draft*** on your animal, whether driven to carriage, wagon or dray. Timken Axles are easily applied to any vehicle, old or new.

Our booklet, "Saving the Horse," tells how the Timken Axle reduces the draft on the horse 50 per cent, shows how the wheel runs twenty minutes on the Timken Axle before losing as much momentum as it does in one minute on the ordinary axle. Gives interesting and valuable information for the owner of driver of motor, carriage or heavy wagon. Whether you buy the Timken Axle or not, send for the booklet—it is FREE.

Timken Roller Bearing Axle Co., 1111 N. Jefferson St., St. Louis.





An Early TIMKEN Advertisement 1901

Since then—80,000,000 Timken Tapered Roller Bearings—the *best* Timken Bearing advertisement

The Timken Roller Bearing Co
CANTON, OHIO

TIMKEN
Tapered
ROLLER BEARINGS

The Pioneers

THE human animal quickly takes things foregranted. The nurseryman soon loses his ability to smell the rose; and, happily, the truck gardener soon does not smell the cabbage.

And we, "buddying" with it, speak of the Automotive Industry hundreds of times a day—superficially, thoughtlessly, with the coldness of habit.

There's more to it than just Business. Brilliant, ingenious men don't link themselves for life to penny-chasing business.

Business, yes! But Romance, and Faith, and Fiery Spirit of Adventure. Business, yes! But the business of "going somewhere"—"moving"—"on the jump"—"majestic transportation"—"miraculous motion."

Americans, it is alleged, have mortgaged their homes to buy motor cars. Pess-optimists claim that today 80% of the sales are "on time." And the professional fretters wring their hands!

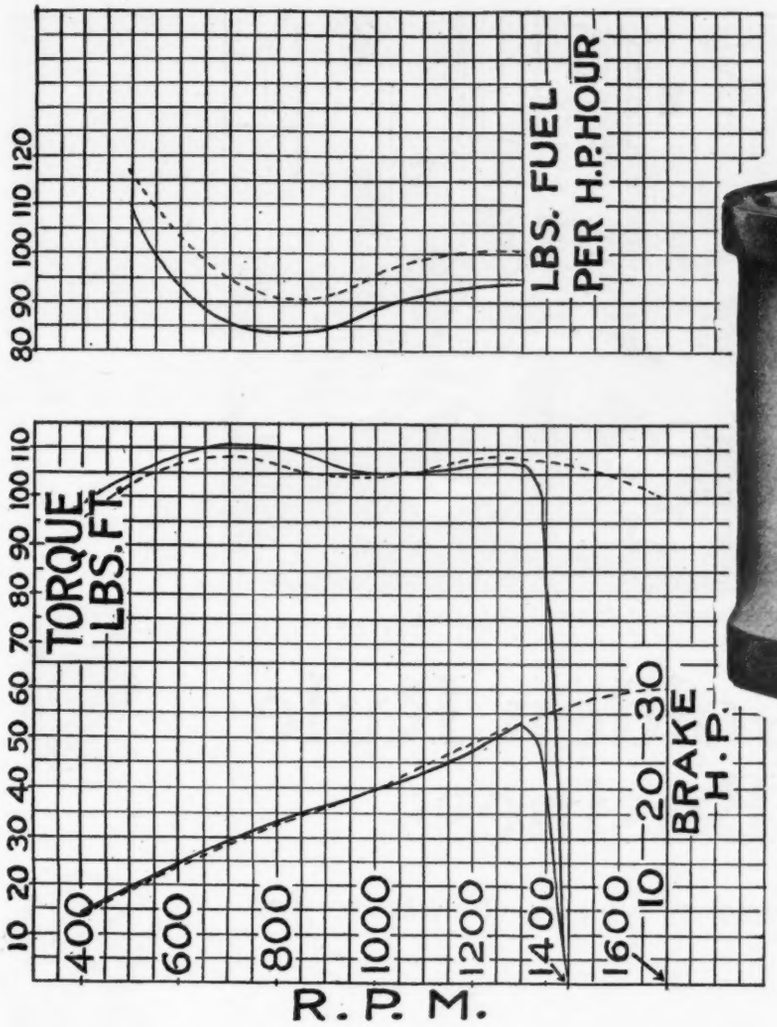
But meanwhile the Scranton drug-clerk tours New England and the Gopher Prairie machinist takes his kids motoring to Niagara Falls.

We hereby appoint those old fogies—"nuts" they called them then—who with vision and (it's the only word) guts looked ahead into, say 1923, and worked; we appoint those sweating pioneers, Haynes, Apperson, Olds, Duryea, Timken, Winton, et al, as the real "See America First" Campaigners.

And rather far-sighted in their seeing, too!

Editorial from The Daily S A E,
White Sulphur Springs, W. Va., June, 1922, by
The Timken Roller Bearing Company, Canton, Ohio

Henry Timken Sr. in one of the early Timken equipped horseless Carriages



A composite power curve.
With Governor ————
Without Governor ——

The makers of the K. P. Governor ask nothing better than to demonstrate, by dynamometer or road test, the amazing efficiency of its product.

At last—a governor that fills the bill!

Controlled by vacuum and not by gas velocity.

Installed between the carburetor and intake —the area around its plunger is always greater than carburetor throttle opening. There is absolutely no restriction.
Simple — one moving part — needs no attention, and no lubricating.

TEST the K. P. Governor on your engine — This is what you will discover.
That it prevents speeding beyond the desired R. P. M. for which it is adjusted.
That it does this without affecting engine power whatsoever—regardless of conditions.
That it won't steal or increase speed at partial throttle openings —and you can't make it do this.
That it won't surge and you can't make it surge.
That it gives quick opening and acceleration. (No load to full load in 100 revolutions).
That it is small and compact and easy to install.
That it is easy to adjust and once adjusted stays put.
That once installed and adjusted it is tamper proof.
These are the requirements of a good governor.
The K. P. completely fills the bill.

K. P. PRODUCTS CO. Inc.,
50 Pine St., New York City,
N. Y.

K·P. Governor
GOVERNS WITHOUT LOSS OF POWER

Strom Service Department, Home Office, Chicago

The Golden Rule in Business

We give the kind of service we like to get

Strom service is as good as we know how to make it. We have studied what manufacturers need. And we have adapted our service to their needs.

On orders for ball bearings from stock we can frequently make shipments the same day the order is received.

Where technical advice is needed, our corps of experts is at your service. They are familiar with every type of ball bearing installation ever made. We will be pleased if you will call on us.

Our interest in our installations continues long after we have made delivery. We are concerned with the successful operation of our bearings throughout their lives.

We believe in the golden rule in business. We give the kind of service that we like to get.

Double-acting thrust bearing, flat seats (grooved races) 2100-F Series

Single-acting thrust bearing, flat seats (grooved races) 1100-F Series

Single-acting, self-aligning thrust bearing 1100 Series

Single-acting, self-aligning thrust bearing, leveling washer. 1100-U Series

Double-acting, self-aligning thrust bearing, leveling washers 2100-U Series

Single-row deep-groove Standard type, radial bearing

Double-row, deep-groove Standard type, radial bearing

Angular contact bearing, combination radial and thrust

Double-row, maximum type, radial bearing

Single-row, maximum type, radial bearing

Strom BALL BEARINGS

"Wherever a Shaft Turns"

U. S. BALL BEARING MFG. CO.
4531 Palmer Street, Chicago, Ill.

30 Presses devoted to making special washers of any size or thickness. 2000 washer dies ready for use insures quick supply of your needs.

An assembly of independent units—thus you might describe your product. And, if the complete product is to represent the standard that you adhere to, then each unit that goes into your product must embody all of those tangible and intangible elements that, combined, make for quality.

Stampings—some of the merits of your product may be stampings. We take it for granted that you will not only demand stampings accurate to blue print specifications, perfectly aligned, exact in gauge and well finished, but will appreciate the motives that guide an organization in producing such goods. Does not this attitude of feeling a sharing of the responsibility for the quality of your product insure you rigid inspection, prompt deliveries, courteous and full hearted co-operation?

Trust the power of a business principle as practiced by this company to get your stamping out on time.

Manufacturers of Bright Heat Treated Cap Screws

CAP & SET SCREWS WASHERS AND  **METAL STAMPINGS RIVETING BURRS**

The CLEVELAND WROUGHT PRODUCTS CO.
CLEVELAND, OHIO

Branch Offices:

San Francisco, Calif.....813 Sheldon Bldg.	El Paso, Tex.....Mills Building
Los Angeles, Calif.....716 Higgins Building	Chicago, Ill.....34 No. Clinton Street
Seattle, Wash.....1016 L. C. Smith Building	New York City.....74 Murray Street
Buffalo, N. Y.....76 Pearl Street	Detroit, Mich.....2-132 General Motor Bldg.

DUCK

for Car and Truck Tops

An Unusual Opportunity for Body Builders

More than 1½ million yards of miscellaneous fabric for sale at the Boston Auction, Jan. 17

Altogether there are approximately 1,807,991 yds. of duck to be offered at this Boston Auction. Nearly one-third of it is paraffined, waterproof duck ordered by the Chemical Warfare Service for protecting soldiers' gas masks. This material should be of particular interest to top manufacturers, especially those concerns that are making tops for commercial trucks and small delivery cars.

This material is located at two points, as follows:

Edgewood Arsenal, Md.—558,190 yds. 12.5 O.D. paraffined duck, waterproofed, 29-29½ in. wide.

Army Supply Base, Boston, Mass.—1,249,-801 yds. miscellaneous commercial duck, various widths, weights and shades.

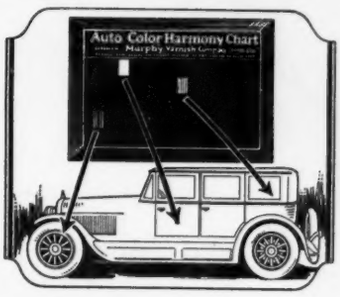
Top manufacturers should inspect this material at each place and arrange to be represented at the bidding in Boston, January 17th.

This duck will be offered in 5,000-yard lots and larger, making it convenient for top manufacturers to buy only the quantity and grade required. Write for the catalog describing all lots and giving terms of sale. Copy may be obtained from the Q. M. Supply Officer, 1st Ave. & 59th St., Brooklyn, N. Y., or the Commanding Officer, Army Supply Base, Boston, Mass.

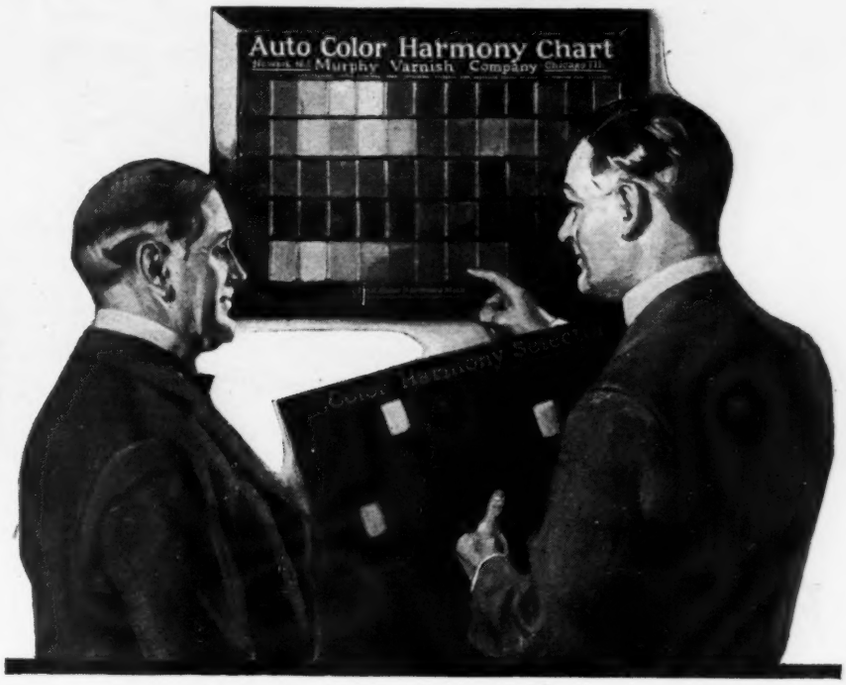
The Government reserves the right to reject any or all bids.

In the same catalog you will find about 50 used machine tools of well-known makes. This equipment consists of drills, lathes, grinders, milling machines, drop hammers and motors. Two reasons for automotive concerns to read the catalog.

WAR DEPARTMENT



The black selector picks out the color harmony



Today Color Harmony is a more important factor than ever in the selling of motor cars

The insistent demand for bright, gay colors in the painting of motor cars is a fact—not a theory.

Here is how one authority states the case: "There has been a greater increase in the use of bright color schemes in autos during the past year than in the ten previous years combined. Every Main Street now looks as though the rainbow had been harnessed in the shape of American made motor cars."

Color is King—no doubt about that. But mere color is not enough—people want *Color Harmony.*

The quickest method ever devised for determining color-harmonies

All questions of color harmony are promptly answered by that wonderful device—the *Murphy Auto Color Harmony Chart.*

This Chart was specially adapted for the Murphy Varnish Company's use from the Taylor Color Harmony System—the simplest and quickest system ever discovered for determining color harmonies.

Color harmony problems cease to exist the moment you adopt the Auto Color Harmony Chart. We will be glad to tell you all about the chart and to explain how you can employ it to excellent advantage in your painting shop. No obligation. Use the coupon.

Murphy Varnish Company

Save the surface and you save all" – Murphy Varnish

Newark, N. J. **Chicago, Ill.**

Murphy Varnish Company, Limited, Montreal, Canada
***Successor to* The Dougall Varnish Company, Limited**

MURPHY VARNISH COMPANY,
224 McWhorter St., Newark, N. J.

Gentlemen: Please show how the Auto Color Harmony Chart will benefit our business. We understand this does not obligate us in any way.

Name .....

Address .....

Why all Formica Gears hold their dimensions

FORMICA gears hold their dimensions under the conditions that exist in the timing gear case of a motor car. Heat, oil or moisture do not affect them.

This is true of *all* Formica gears, because Formica is *uniform*. That uniformity is difficult to maintain. And it is only by large expenditure of money and effort that Formica has been able to develop a system of manufacture, and perfect a control, that makes it possible.

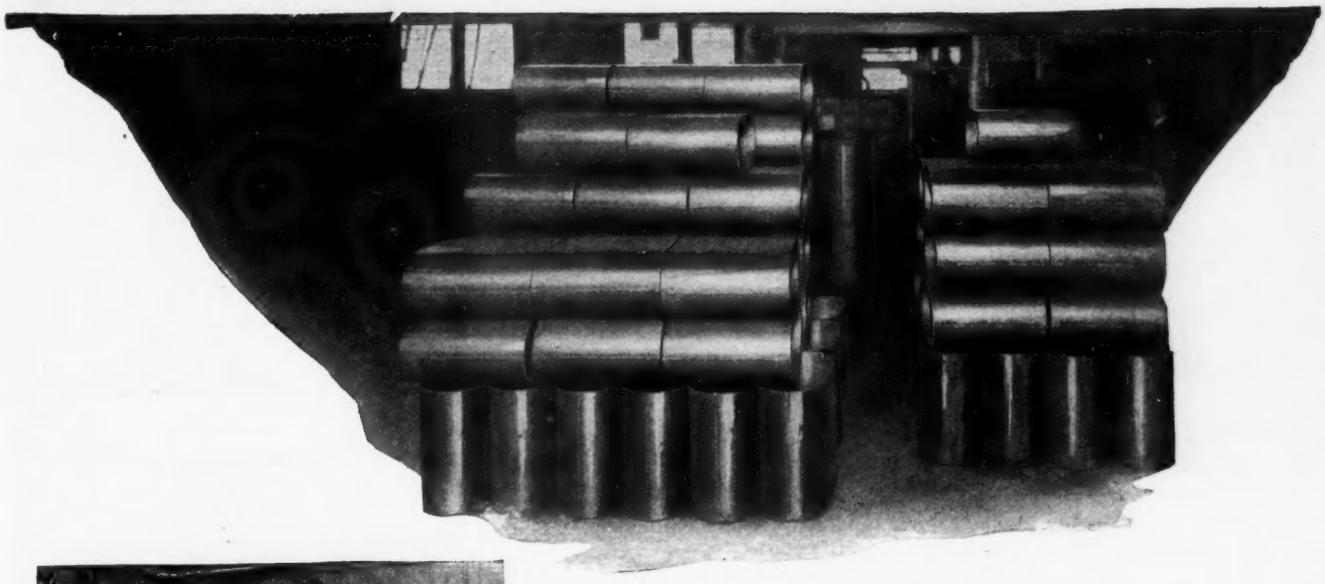
The fabric base of Formica gears is woven to Formica specifications and most closely inspected. Formica mixes its own Redmanol resin, and allows it to re-act or age through a rigidly set period before use. Every condition that affects manufacture is subject to accurate measurement.

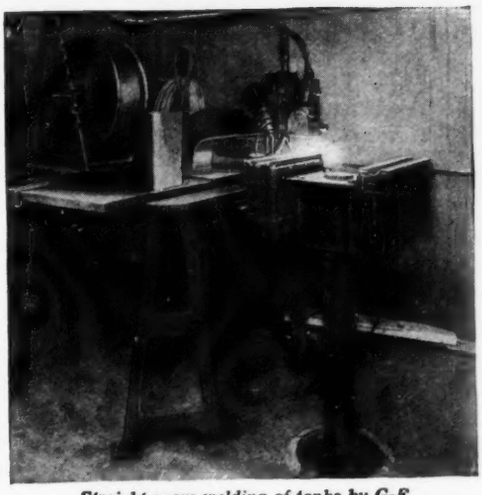
That is why Formica is now selling more automobile manufacturers timing gear blanks, than the makers of all other similar materials put together. Many of these customers have used Formica exclusively for years. They have a satisfactory experience covering many thousands of gears.

Let Formica engineers tell you the story

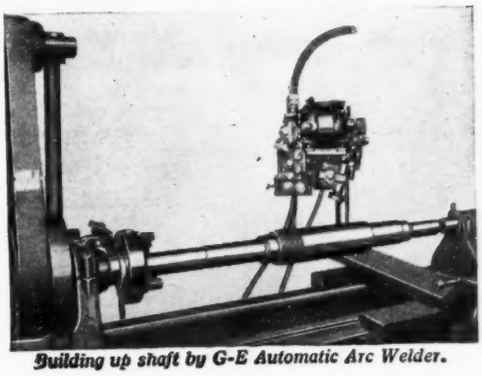
THE FORMICA INSULATION COMPANY
4622 Spring Grove Avenue, Cincinnati, Ohio

FORMICA
Made from Anhydrous Bakelite Resins
SHEETS TUBES RODS





Straight seam welding of tanks by G-E Automatic Arc Welder.



Building up shaft by G-E Automatic Arc Welder.

Automatic Arc Welding

The above picture shows 50 tanks welded by a G-E Automatic Arc Welder in a half day, as compared to 21 tanks welded by the hand method in a full day. The metal welded is 1/8″ thick by 24″ long.

Through this automatic application of the electric arc, a steadiness of the electrical conditions in the arc is obtained and maintained, resulting in a uniform and high quality of weld—and higher speed. Higher welding speeds produce lower welding costs.

The principal field for the G-E Automatic Arc Welder is the production, by welding, of duplicate objects in considerable quantities.

Its greatest use is for straight line seam, which is the simplest form of weld—but it also does efficient welding of circular seams, and in building up processes on metal.

G-E welding engineers will cooperate with you in making suitable applications of the Automatic Arc Welder to processes of production in your plant. Ask them.

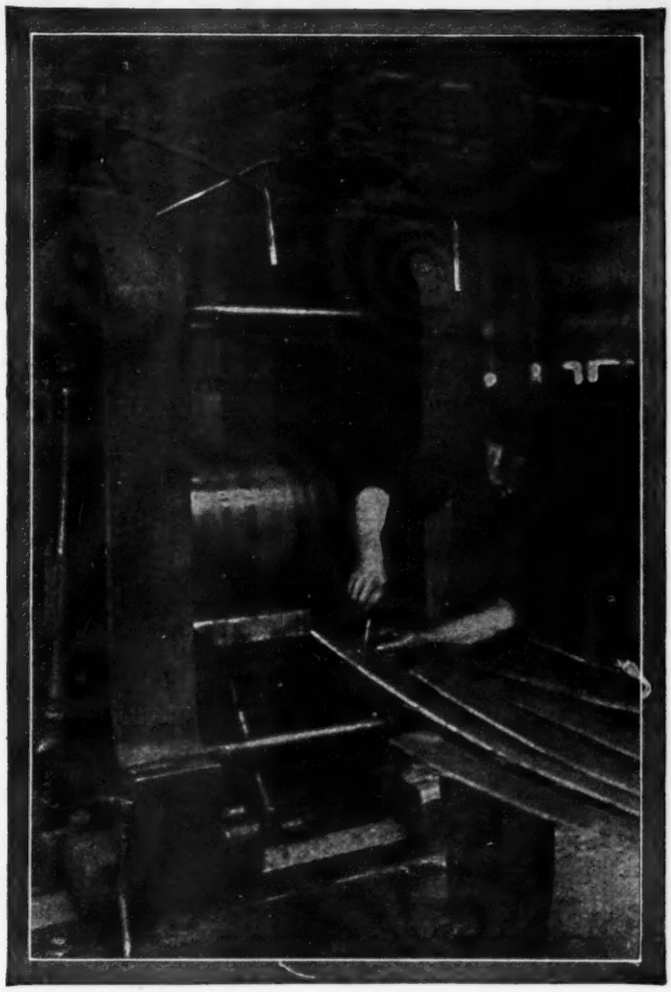
General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

4-B-714


G BREWER GRIFFIN
Manager, Automotive Equipment Department
A B REYNDERS
Works Manager
A M DUDLEY
Manager Engineering
At the Automobile Shows
Engineers and other interested Officials of the Automotive Industry are cordially invited to visit Westinghouse Headquarters during Automobile Show week, where, available for inspection, will be found Starting, Lighting and Ignition Apparatus embodying many new developments and innovations.
Remember the Place
NEW YORK
Hotel Biltmore
Jan. 5 - Jan. 12
CHICAGO
Hotel Congress
Jan. 26 - Feb. 2
W P LOUDON
Designing Engineer, Springfield
B D KUNKLE
Superintendent in Charge of Manufacturing
M B SPEER
Service Superintendent
G H LEWIS
Assistant Manager Automotive Equipment Department
W A DICK
Commercial Engineer
P C RITCHIE
Territorial Sales Representative, Chicago
C W DOANE
Territorial Sales Representative, Detroit
A E JACKMAN
Territorial Sales Representative, Cleveland
A D TURNER
Publicity Representative
E A COUSINS
Assistant Sales Representative, Detroit
Westinghouse

CHASE



"THE OLD BRASS ROLLER"

Just one phase of brass making has resisted scientific methods and automatic machinery. That is the rolling of sheet brass. Here the human element still remains in the person of the "Old Roller." It is his skill and experience that determine the exactness of gauge and temper. No machine has replaced him.

We are fortunate in having just such experienced and skilled rollers in our organization, who have been with us for years, and who produce sheet brass of that excellent quality the automotive industry is looking for.

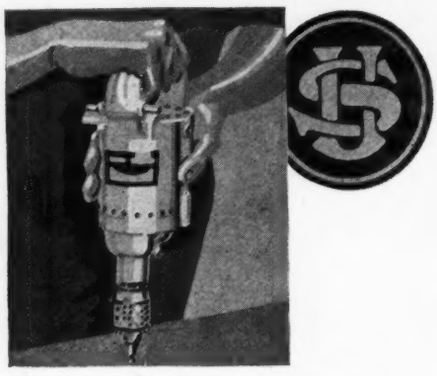
CHASE METAL WORKS

Division of Chase Companies Inc

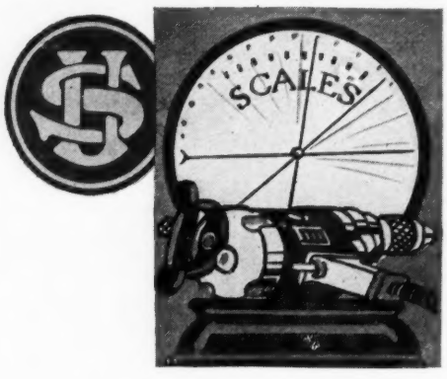
WATERBURY CONNECTICUT

Just Wading In

Power *and* Endurance Without Excess Weight



A Cool Running Drill



Compare the Weight

Reason Enough for specifying

UNITED STATES
Portable Electric
DRILLS

"The Good Mechanic Knows"

DRILLS GRINDERS BUFFERS REAMERS

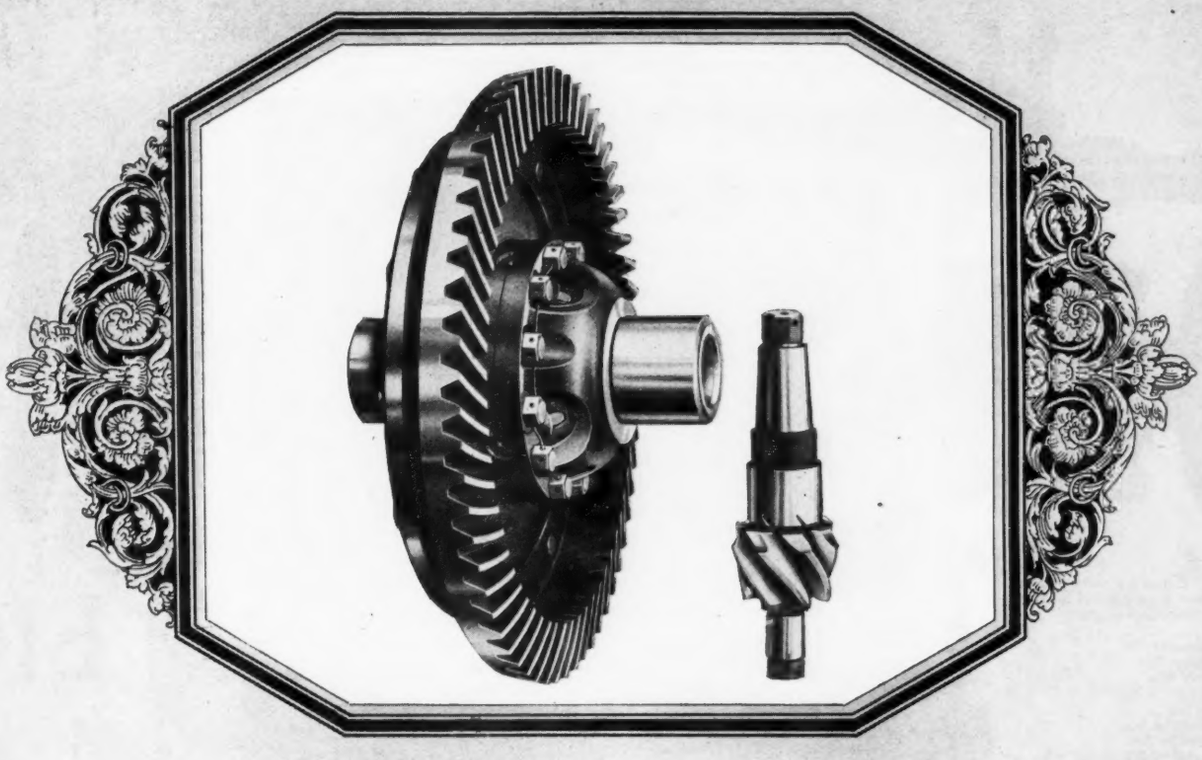
Write for Catalog 21-A TODAY.
It's a valuable addition to any desk library.

The UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO.

District Sales Offices and Service Stations:

Boston	Detroit	New York
Buffalo	Houston	Philadelphia
Chicago	Indianapolis	Pittsburgh
Cleveland	Kansas City	St. Louis
Columbus	Milwaukee	Toledo
	Minneapolis	

Complete stocks carried in all service stations



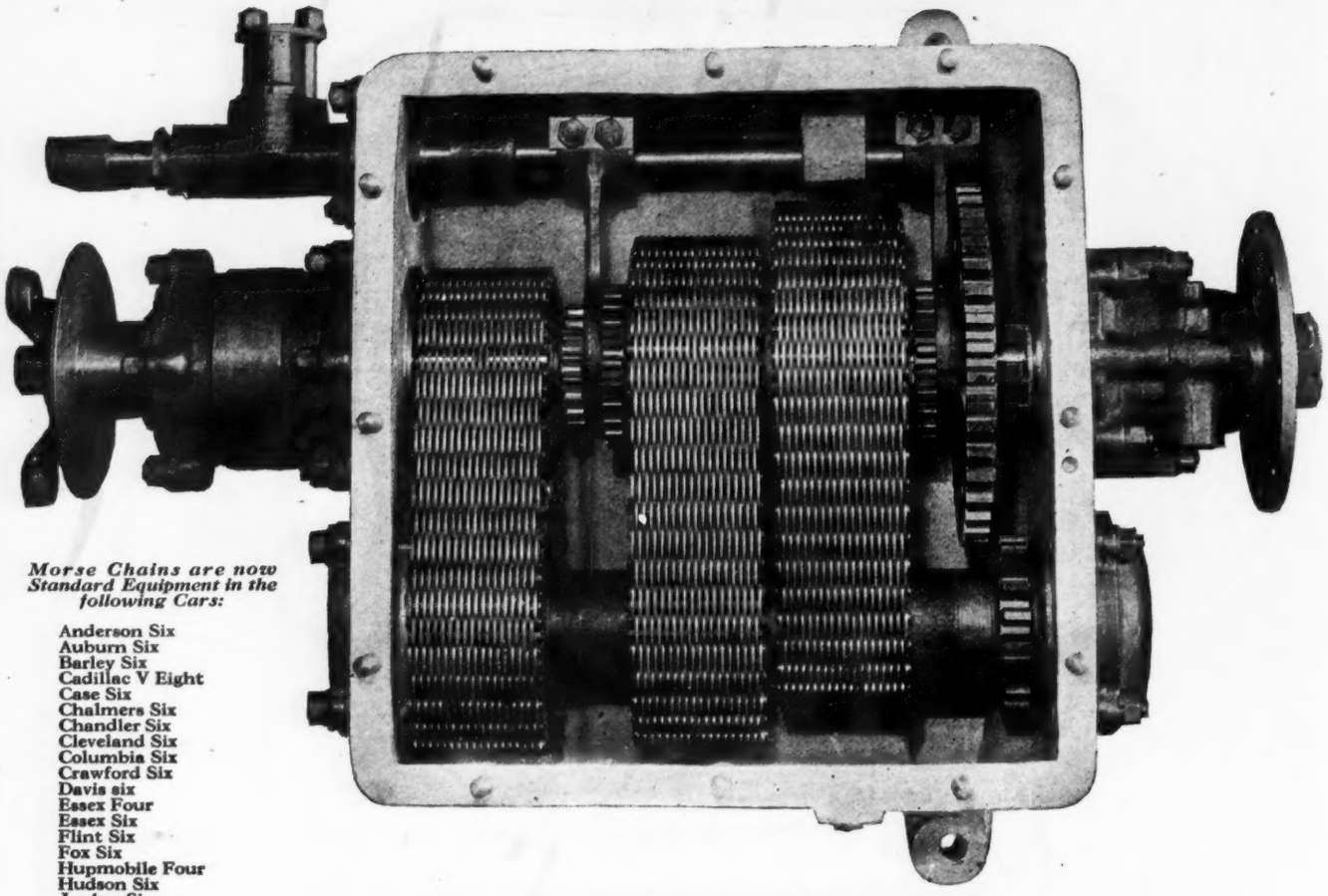
MOST of the successful motor car and truck manufacturers are known to be discriminating in the extreme, when selecting those units which they purchase outside their factories. As an interesting coincidence: Brown-Lipe-Chapin products almost invariably appear in their specifications.

Manufactured at Syracuse, N. Y.

BROWN-LIPE-CHAPIN

DIFFERENTIALS — BEVEL DRIVE GEARS

The Best Bus Transmission



Morse Chains are now Standard Equipment in the following Cars:

Anderson Six
Auburn Six
Barley Six
Cadillac V Eight
Case Six
Chalmers Six
Chandler Six
Cleveland Six
Columbia Six
Crawford Six
Davis six
Essex Four
Essex Six
Flint Six
Fox Six
Hupmobile Four
Hudson Six
Jordan Six
Lafayette Eight
Lincoln Eight
Moon Light Six
National Six
Northway Four
Oakland Six
Packard Single Six
Packard Single Eight
Packard Twin Six
Rickenbacker Six
Stearns Four
Stearns Six
Sterling-Knight Six
Studebaker Light Six
Star Four
Templar Four
Winton Six
Continental Motors

Just as Morse Chains promote smooth, silent efficiency in the front end drive in engines—Morse Chain transmissions eliminate clashing, noisy, gear shifting for busses.

You should investigate this important advantage of Morse Chain Transmission.

MORSE CHAIN COMPANY

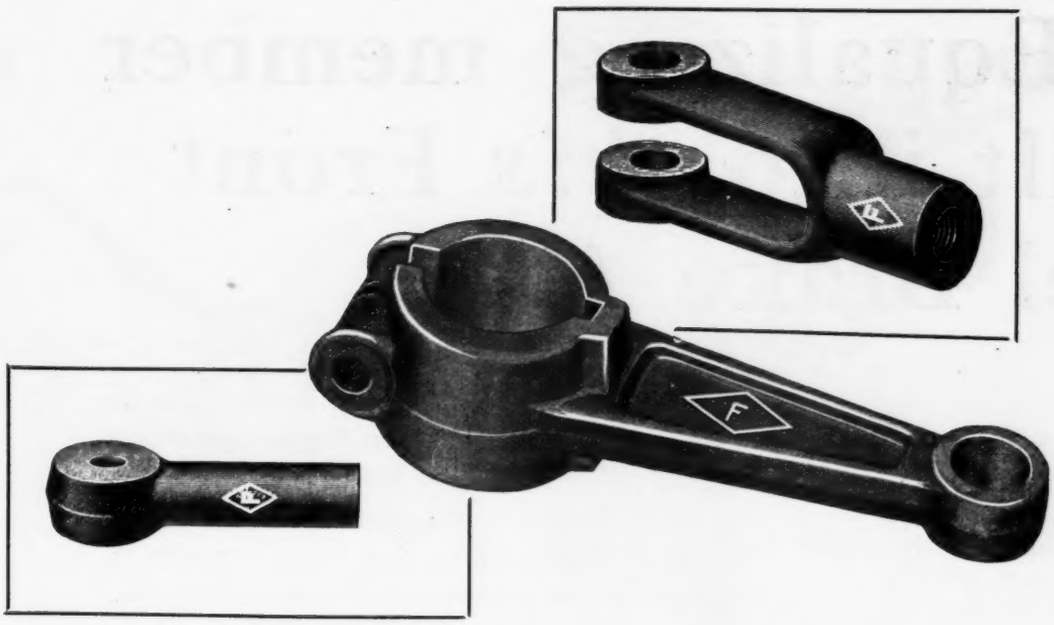
Main Office and Works
ITHACA, NEW YORK

Sales and Engineering Office
DETROIT, MICHIGAN

THE CONSTANT PRESSURE ANGLE CHAIN

MORSE

GENUINE SILENT CHAIN



Old line—

New Trade-Mark—
Service better than ever!

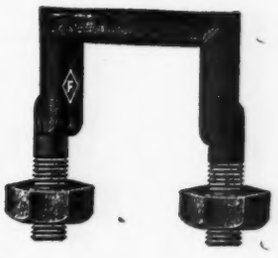
Pat. Nov. 15, 1921

Our specialization in Yoke Ends Brake Rod Assemblies, Spring Clips, Shackle Links, Levers and the Gemmer Brake Rod Adjuster enables us to offer the highest quality Drop Forgings at the lowest competitive prices.

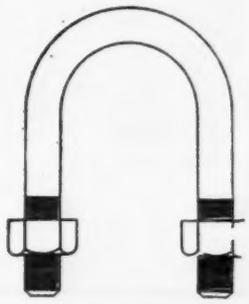
We are the sole manufacturers of the Gemmer Brake Rod Adjuster, **the keystone of equalized brake adjustment,** now used as standard equipment by more than 75 makers of automotive vehicles.

Pat. Aug. 14, 1923

It does away with, and saves the cost of, turnbuckles, adjustable yokes, lock-nuts, cutting and threading of rods. Just turn the thumb screw to take up the wear. **It locks automatically.**



Quotations cheerfully furnished.



Keystone Forging Co.

Consolidated with M. J. Ford Mfg. Co.

Plant—Northumberland, Pa.

New York Office—347 Fifth Avenue

Detroit Office—General Motors Bldg.

The Equalizing member is built into *this* Front Wheel Brake Axle

To be exhibited at National Auto Shows, New York, 258th Field Artillery Armory, Jan 5 to 24; Space No. 99. Chicago Coliseum, Jan. 26 to Feb. 2; Space No. 43.

THE U. S. Front Wheel Brake Axle is complete in itself even to the equalizing device which keeps the brake pressure equal on both wheels.

This unity of construction is an important feature since it makes possible a sturdy axle, whose brake action is thoroughly dependable, besides greatly simplifying the problem of installation.

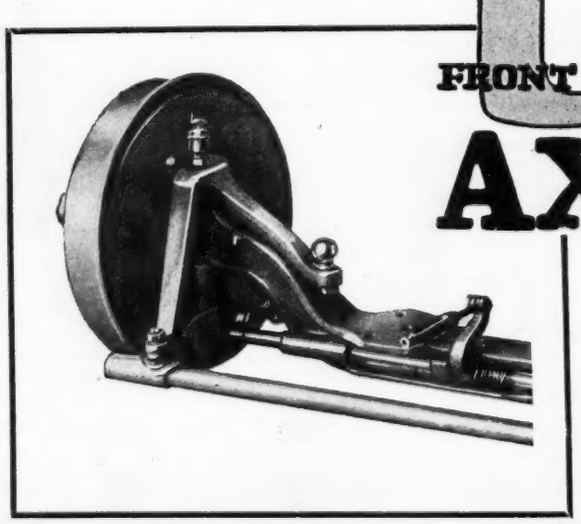
The U. S. Front Wheel Brake Axle can be hooked up to and equalized with any conventional rear axle or transmission brake without greatly disturbing production arrangements and without adding greatly to costs.

Brought to utmost simplicity consistent with good performance, adjustable to any stop limit, smooth in action—the U. S., in use on many cars, deserves your attention.

Ask for complete details.

U. S. Axle Co. Pottstown, Penna.

Pioneer Builders of Front Wheel Brake Axles



The Front Wheel Brakes are operated by means of a shaft carried on the axle center through which the pressure on the pedal is carried to the brake shoes. The operating shaft is free to move longitudinally giving equalized pressure on both sides.

US
FRONT WHEEL BRAKE
AXLES

Try to strip these Threads—

You know what happens to the threads of an ordinary bolt when you try to jam on a misfit nut.

But when you try it on an Empire *New Process* bolt, it's the nut that suffers.

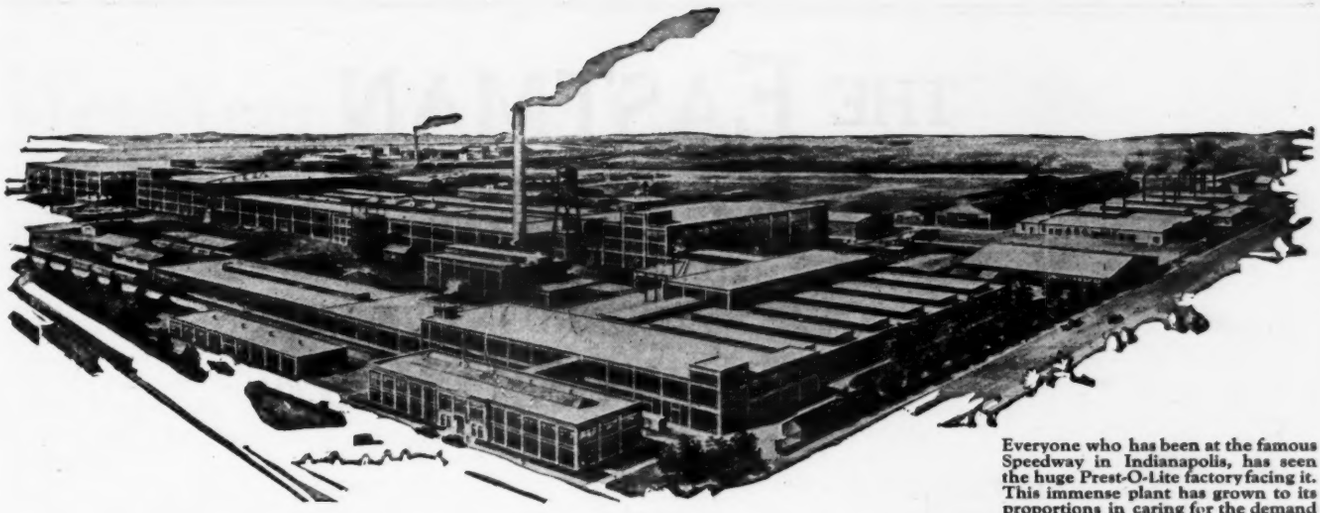
The threads of a *New Process* bolt will resist any effort of the wrench to strip them. They are *built up,* not cut, by a new method that gives them unbelievable strength and accuracy.

Samples for testing will be sent on request.

P. S.: If you put an Empire cold punched steel nut on an Empire New Process bolt, you won't have to do any jamming —for they fit together like a pair of gauges.

RUSSELL, BURDSALL & WARD
BOLT & NUT COMPANY
PORT CHESTER, N.Y.
PEMBERWICK, CONN. · CHICAGO · SAN FRANCISCO ROCK FALLS, ILL.
Makers of Bolts, Nuts and Rivets Since 1845

EMPIRE New Process BOLTS



Everyone who has been at the famous Speedway in Indianapolis, has seen the huge Prest-O-Lite factory facing it. This immense plant has grown to its proportions in caring for the demand for Prest-O-Lite Batteries and Gas.

Concerning Character and Reputation

The character of an institution is what it really is. The reputation of that institution is what the public believes it is. In the long run character and reputation become one and the same thing, for no man nor institution can for long enjoy a good reputation built on a bad character.

Starting in the early days of the automobile this organization began to serve motorists. It has served motorists ever since. We are proud of having furnished the oldest service known to motorists, because of the character of that service. A great organizatson has developed since we started to serve motorists, but the ideal, the character of that service haa remained constant.

Today motorists depend upon Prest-O-Lite Battesies for starting and lighting just as in the early days they depended upon Prest-O-Lite gas for lighting. And to this very day the most efficient and economical truck lighting is furnished by Prest-O-Lite Gas.

What serves best is the idear behind Prest-O-Lite gas. Today it means Prest-O-Lite batteries for automobiles Prest-O-Lite gas for trucks. Ten years from now whoknows what changes will come. But whatever comes Prest-O-Lite service will be in the forefront. That is the character and the reputation of Prest-O-Lite.

THE PREST-O-LITE COMPANY, Inc.

New York Offices: 30 East 42nd Street
Pacific Coast Office: 599 Eighth Street, San Francisco
In Canada: Prest-O-Lite Company of Canada, Ltd., Toronto

Dealer Note:
If there is no Prest-O-Lite distributor in your city you you can buy direct from our factory at factory prices. Write us.

"THE OLDEST SERVICE TO MOTORISTS"

More Federals are in use than any other make—

More Federal Welders are used by the automotive industry than any other make of welder. Federal is the world's largest maker of spot, seam and butt welders. One of our latest is the Federal "Junior" illustrated above.

The Federal "Junior" Spot Welder is capable of welding two pieces of bright $\frac{1}{16}$" steel at the rate of 120 welds per minute. Its maximum capacity is two thicknesses of $\frac{1}{8}$" iron or steel. Pressure is maintained after the switch opens—until the weld has "set."

THE LARGE COPPER SLOTTED FACE-PLATE permits adjustment of the lower conductor both sidewise and up or down. Upper conductor may be moved in or out. Both swivel. Permits the use of jigs and fixtures. Can be supplied for either electric motor-drive or belt-drive from the lineshaft.

The Federal line complete. But when our various standard machines will not answer, we design special machines for your particular purpose. Our engineers are always at your service, without obligation. Write us freely.

Federal

Branches in Twelve Principal Cities

The Federal Machine & Welder Co.
Warren, Ohio

PALMER ASBESTOS & RUBBER CORP. TRADE MARK CHICAGO

RESULTS *of Experience*

Lee Miles, President of the Louisville Taxicab & Transfer Company, writes us:

"Actual mileage records for 12 months on eight of the most reputable makes of brake lining on the market has answered our question as to what brake lining we can use that will not slip, squeak, swell or grab, yet has a safety gripping quality.

"PALMER *FOLDED* Brake Lining is the answer.

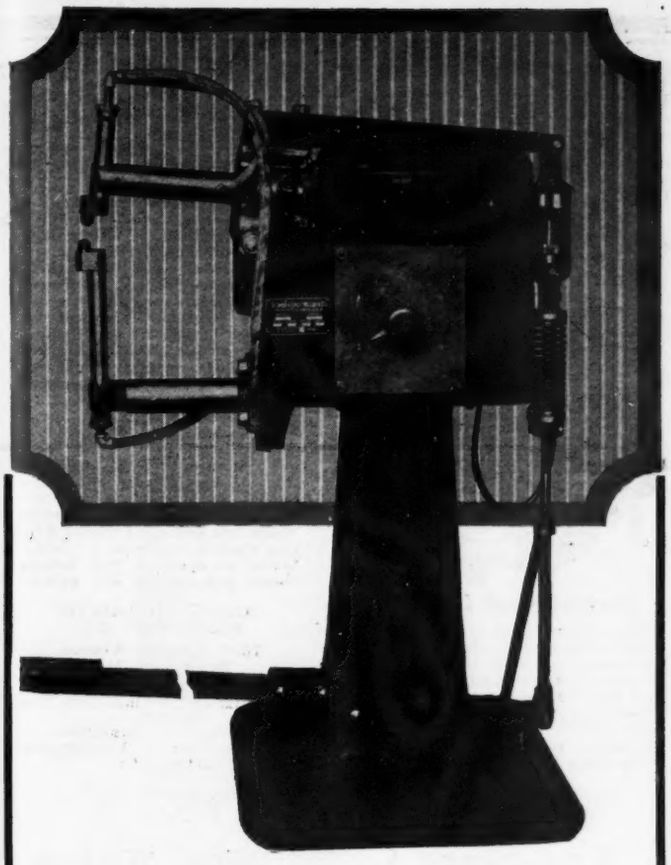
"PALMER *FOLDED* Brake Lining for the past 12 months has cost us 20c per thousand miles, while the next best lining on the market cost us 65c per thousand miles. It is not first cost that makes the difference, but the mileage run per set.

"Safety is our slogan; that is why we use PALMER *FOLDED* Brake Lining."

Is *your* brake lining as satisfactory?

PALMER ASBESTOS & RUBBER CORPORATION

RAILWAY EXCHANGE CHICAGO



Unusual RANGE
Unusual PRICE

This New Thomson Spot Welder can handle two pieces of metal thinner than .015" or two pieces thicker than 5/32". Compare this RANGE with that of other spot welders. Then let us tell you the PRICE.

In this No. 100 Spot Welder you get:—

A practically FIRE-PROOF primary coil, even though overloaded. Entirely NEW Type of transformer-core permitting changing primary coil without dissembling.

A secondary lead connection of HIGHEST CONDUCTIVITY — one that WILL NOT HEAT UP.

An adjustable Spring Action that gives EASIER operation and LASTS LONGER. Foot treadle of MACHINERY STEEL— bendable but UNBREAKABLE.

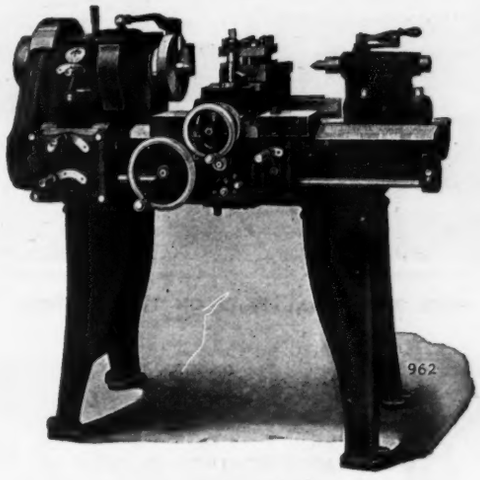
Let us send bulletin and tell you the price.

Thomson Spot Welder Co.
Cincinnati, Ohio, and Lynn, Mass.

THOMSON

For the Quantity Production of Small Work Involving Plain Turning and Facing

LE BLOND
11 INCH
HEAVY DUTY
Rapid Production Lathe

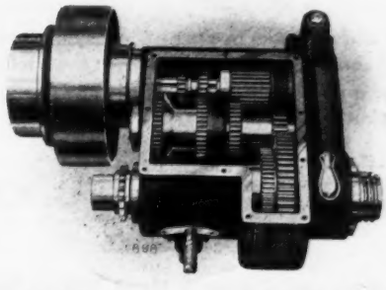


A sturdy, high powered, manufacturing lathe for the quantity production of small parts involving plain turning and facing operations.

It is made with a six speed, selective, geared headstock, a high speed, three speed geared headstock. It can be furnished as a plain turning lathe or with an automatic back facing attachment.

This lathe has many distinctive features tending toward greater production, all described in our literature.

Actual swing over shears 13¾".



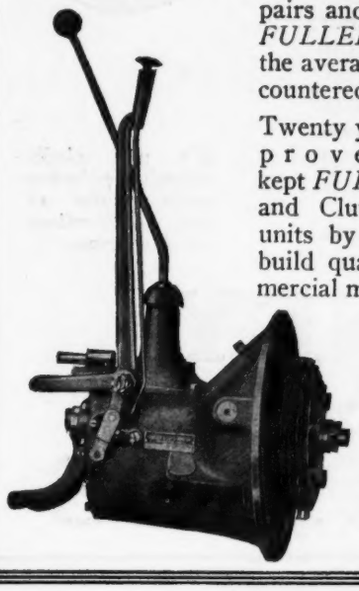
Interior View, Six Speed Selective Geared Headstock

The R. K. LeBlond Machine Tool Co.
Cincinnati, Ohio

THE abuses to which transmissions and clutches are subjected in the hard service of truck operation have given us an opportunity to demonstrate the strength and engineering perfection of *FULLER* Transmissions and Clutches.

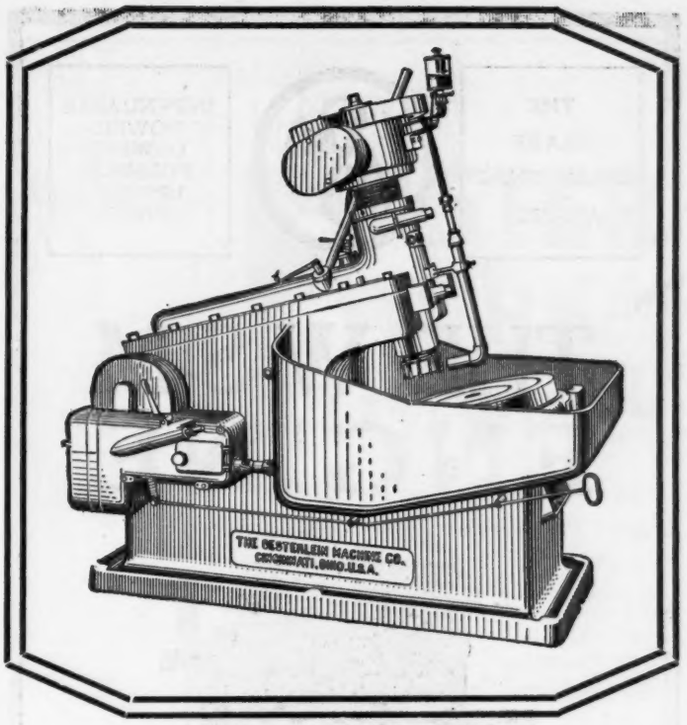
Research and investigation show that the expense of repairs and adjustments on the *FULLER* units is far below the average figures usually encountered for such work.

Twenty years of constant improvement have kept *FULLER* Transmissions and Clutches the preferred units by manufacturers who build quality into their commercial motor vehicles.



Fuller & Sons Manufacturing Co.

Kalamazoo, Michigan, U. S. A.



Helps Make "A Six for $750"

The astounding accomplishment of the Olds—their wonderful new Six-cylinder Car for $750—is the acme of production effort, to the man familiar with the workmanship it displays.

We are pleased to say that our OHIO Tilted Rotary Milling Machine plays a major role in the production of this mechanical masterpiece.

Other users of this production tool are—

CADILLAC	LYCOMING	HUDSON
INTERNATIONAL	BUICK	GEN. MOTORS
	WHITE	CONTINENTAL

If *your* milling costs are too high, you are invited to send us either blueprints or actual samples for our time estimates. No obligation.

OHIO

TILTED ROTARY

The Oesterlein Machine Co.

CINCINNATI, OHIO

HOOVER

The World's Largest Ball Plant

STEEL
BRASS
BRONZE
MONEL METAL
BELL METAL
ALUMINUM
AND HOLLOW BALLS

HOOVER STEEL BALL CO.
ANN ARBOR, MICH.

CLASSIFIED ADVERTISING

RACING CARS FOR SALE—Two (2) new Racing Cars, one man type, complete less engines, built for Indianapolis Race by Louis Chevrolet, with extra wheels and different ratio gears. Address Box 532, c/o Automotive Industries.

SALES POSITION

desired, by a sales representative for large unit and parts manufacturer. Honorable and successful sales record. Large acquaintance in Ohio and Michigan automobile factories, which assures proper consideration for product handled. A manufacturer having a hard sales job demanding a man of aggressiveness and initiative communicate with Box L-317 W. Fort Street, Detroit, Mich.

Attorney-at-Law and Solicitor of Patents
Formerly Member Examining Corps, United States Patent Office

C. L. PARKER

American and foreign Patents secured. Searches made to determine patentability and validity. Patent suits conducted. Pamphlet of instructions sent upon request.

McGill Building, WASHINGTON, D. C.

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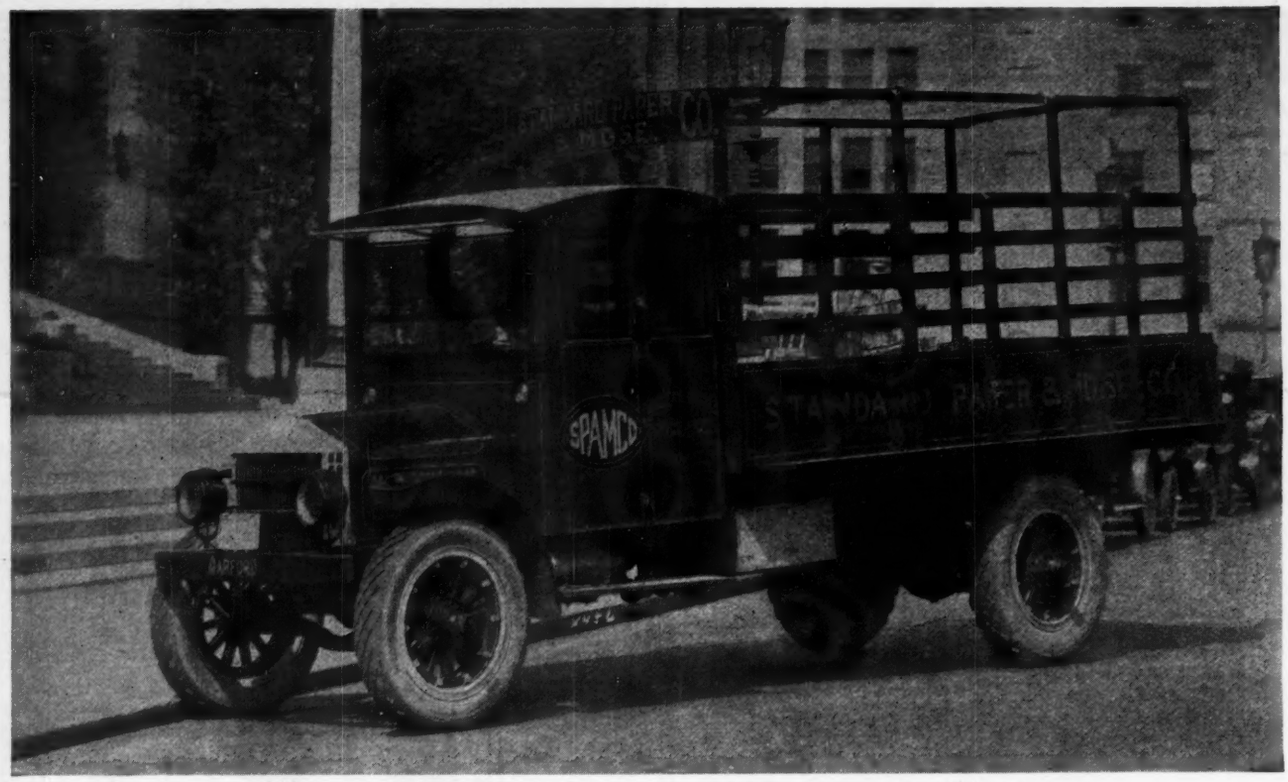

Buda-powered Garford Truck, built by the Garford Motor Truck Company, Lima, Ohio

THE BUDA ENGINE speaks for itself. It's easy enough to discount *our words*, but impossible to discount *its deeds*. Boldly engraved against the background of the motor world's consciousness is that record of sterling performance it has made through the years—years that have brought new ideals of stamina, of power, of dependability, of low upkeep and economical operation. It's Buda performance that makes Buda-equipped trucks so good to own. It's Buda reputation that makes them *so easy to sell.*

THE BUDA COMPANY, HARVEY CHICAGO SUBURB ILL.
ESTABLISHED 1881

Buy only genuine Buda Parts for your Buda engine. New Parts Catalog No. 432 is now ready

BUDA
The
ENGINE

COTTA
TRANSMISSIONS

GEARS ALWAYS IN MESH

WHERE THE VERY BEST IS REQUIRED
YOU FIND A

COTTA USED

An Assurance of Dependable Service

for Trucks
Buses
Locomotives
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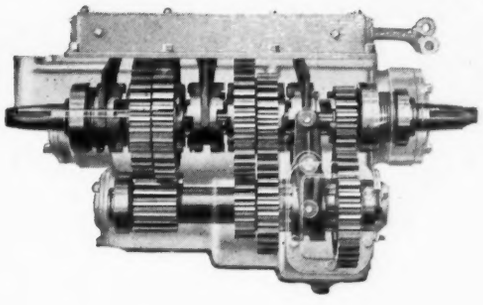
Fire Apparatus
Winches
and
Other
Industrial
Units



Cotta Transmission Co.
2300 Eleventh Street
Rockford, Illinois

U. S. Motor Trucks Are Equipped With

LONG
COOLING SYSTEMS

LONG MANUFACTURING COMPANY
DETROIT - - - MICHIGAN

LONG PRODUCTS—RADIATORS AND CLUTCHES